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NUMBER EIGHT.

THE ILLUSTRATED

Annual Register

OF

RURAL AFFAIRS,

FOR

1862.

One Hundred and Sixty Engravings.

ALBANY:

LUTHER TUCKER & SON.

1862.

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FOR THE YEAR 1862,

CONTAINING PRACTICAL

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EMBELLISHED WITH

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BUILDINGS, IMPLEMENTS, FRUITS, GRASSES, &c.

BY J. J. THOMAS,

AUTHOR OF THE "AMERICAN FRUIT CULTURIST," AND "FARM IMPLEMENTS,"
ASSOCIATE EDITOR OF THE "COUNTRY GENTLEMAN" AND "CULTIVATOR."

ALBANY, N. Y.

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1862.

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Publishers' Advertisement 1862

THE ILLUSTRATED ANNUAL REGISTER OF RURAL AFFAIRS has now been so long before the public that few words are necessary with reference to its design and scope. While the contents of its successive numbers are, in some degree, continuous in their character, each forms a separate work by itself. It is issued in advance of the commencement of each year, and furnishes, together with the usual Calendar Pages of an Almanac, a series of chapters upon subjects of Rural interest—largely embellished with Engravings, eminently plain and PRACTICAL in their nature, and serving to illustrate in a concise and attractive way the advances we are making in Agriculture and Horticulture—including, also, the Household Economy of the Farmer—from year to year.

Among the articles of leading importance in the number of the ANNUAL REGISTER for 1862, will be found one upon FARM BUILDINGS, with Thirty Illustrations and Four Designs; upon VEGETABLE PHYSIOLOGY and the Growth of Plants, with Sixty-One Illustrations; upon GRASSES, with Descriptions of Twenty-Two Varieties, and Thirteen Engravings; upon LIGHTNING RODS, and the Method of Putting them Up, with Thirteen Engravings; and upon BALLOON FRAMES and their Construction, with Twenty-Four Engravings. A great variety of shorter articles, for the Orchard, the Garden, the Apiary, and the Dairy, are also given, with Useful Tables, and much relating to Domestic Animals, and general Rural Economy.

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Filed
8-25-81

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ASTRONOMICAL CALCULATIONS IN EQUAL OR CLOCK TIME.

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THERE will be five eclipses this year, as follows:

I. A total eclipse of the Moon, just before and after midnight of June 11. Size, 14.4 digits. (See the table below.)

II. A partial eclipse of the Sun, June 27, in the morning. Invisible in America, but visible in the Indian ocean.

III. A partial eclipse of the Sun, November 21. Invisible in America, but seen in the great Southern ocean.

IV. A total eclipse of the Moon, early in the morning of December 6. Visible. Size, 16.93 digits. (See the table below.)

V. A partial eclipse of the Sun, December 20. Invisible in America, but visible in Asia generally.

Table of the Eclipses of the Moon.

Principal Places.	Eclipse of June 11-12.		Eclipse of December 6.		Principal Places.	Eclipse of June 11-12.		Eclipse of December 6.	
	Begin.	Ends.	Begin	Ends.		Begin.	Ends.	Begin.	Ends.
	H. M.	H. M.	H. M.	H. M.		H. M.	H. M.	H. M.	H. M.
Halifax, N. S.	0 28	3 46	1 31	4 12	St. Augustine, Fla.	11 16	2 33	0 19	4 8
Portland, Me.	0 1	3 19	1 4	4 54	Havana, Cuba ...	11 13	2 30	0 16	4 5
	even.				Detroit, Mich.	11 10	2 27	0 13	4 2
Boston, Mass.	11 58	3 16	1 1	4 51	Columbus, Ohio..	11 10	2 27	0 13	4 2
Quebec, C. E.	11 57	3 15	1 0	4 50	Cincinnati, Ohio..	11 10	2 27	0 13	4 2
Providence, R. I. ...	11 57	3 15	1 0	4 50	Louisville, Ky. ...	11 0	2 17	0 3	3 52
Concord, N. H.	11 56	3 14	0 59	4 49	Indianapolis, Ind.	10 58	2 15	0 1	3 50
Montpelier, Vt.	11 52	3 10	0 55	4 45				eve5th	
Hartford, Conn. ...	11 52	3 10	0 55	4 45	Nashville, Tenn. .	10 55	2 12	11 58	3 47
Montreal, C. E. ...	11 48	3 6	0 51	4 41	Chicago, Ill.	10 52	2 9	11 55	3 44
Albany, N. Y.	11 47	3 5	0 50	4 40	Tuscaloosa, Ala. .	10 51	2 8	11 54	3 43
New York, N. Y. ...	11 46	3 4	0 49	4 39	Madison, Wis.	10 44	2 1	11 47	3 36
Trenton, N. J.	11 44	3 2	0 47	4 37	New Orleans, La. .	10 42	1 59	11 45	3 34
Philadelphia, Pa. ...	11 42	3 0	0 45	4 35	Jackson, Miss. ...	10 40	1 59	11 45	3 34
Baltimore, Md.	11 36	2 54	0 39	4 29	St. Louis, Mo.	10 40	1 57	11 43	3 32
Annapolis, Md.	11 36	2 54	0 39	4 29	Natchez, Miss.	10 37	1 54	11 40	3 29
Harrisburg, Pa.	11 35	2 53	0 38	4 28	Iowa City, Iowa..	10 35	1 52	11 38	3 27
Washington, D. C. .	11 34	2 52	0 37	4 27	Jefferson City, Mo	10 34	1 51	11 37	3 26
Richmond, Va.	11 32	2 49	0 35	4 24	Little Rock, Ark..	10 31	1 51	11 37	3 26
Rochester, N. Y. ...	11 31	2 48	0 34	4 23	Austin, Texas.	10 21	1 38	11 24	3 13
Raleigh, N. C.	11 27	2 44	0 30	4 19	Mexico	10 16	1 33	11 19	3 8
Toronto, C. W.	11 25	2 42	0 28	4 17	Santa Fe, N. Mex.	9 48	1 5	10 51	2 40
Panama, N. G.	11 25	2 42	0 28	4 17	Oregon City, Oreg	8 48	0 5	9 51	1 40
Pittsburgh, Pa.	11 22	2 39	0 25	4 14	Monterey, Cal. ...	8 45	0 2	9 48	1 37
Charleston, S. C. ...	11 22	2 39	0 25	4 14			11th		
Savannah, Ga. ...	11 18	2 35	0 21	4 10	San Francisco, Cal.	8 42	11 59	9 45	1 34
Columbia, S. C. ...	11 18	2 35	0 21	4 10	Astoria, Oregon...	8 37	11 54	9 40	1 29

Total eclipse begins 1 hour and 7 minutes after beginning, and lasts 1 hour and 3 minutes. Total duration, 3 hours and 17 minutes.

The eclipse of December 6 becomes total 1 hour and 9 minutes after the beginning, and lasts one hour and 32 minutes. Total duration, 3 hours and 49 minutes.

Tide Table.

The Calendar pages of this Almanac exhibit the time of high water at New-York and Boston. To find the time of high water at any of the following places, add to, or subtract from, the time of high water at New-York, as below. (There is a great deal of uncertainty about the tides, in consequence of the direction and strength of the winds.)

	H.	M.
Albany,.....	add	6 34
Amboy,.....	subtract	0 39
Annapolis, Md.,.....	add	8 25
Annapolis, N. S.,.....	add	1 49
Baltimore,.....	add	10 20
Bridgeport,.....	add	2 58
Cape Split,.....	add	2 0
Eastport,.....	add	2 9
Hellgate,.....	add	1 41
Holmes' Hole,.....	add	3 30
Machias,.....	add	1 54
Marblehead,.....	add	1 49
New-Bedford,.....	subtract	0 16
New-Haven,.....	add	3 3
New-London,.....	add	1 15
Newport,.....	subtract	0 28
New-Rochelle,.....	add	3 9
Norfolk,.....	subtract	0 41
Oyster Bay,.....	add	2 54
Plymouth,.....	add	2 19
Portland,.....	add	3 12
Portsmouth,.....	add	3 10
Providence,.....	subtract	0 41
Richmond,.....	add	8 15
Salem,.....	add	3 0
Sand's Point,.....	add	3 0
Sandy Hook, N. J.,.....	subtract	0 44
Sunbury,.....	add	0 19
Throg's Neck,.....	add	3 7
Windsor,.....	add	2 49

Chronological Cycles.

Dominical Letter, E: Golden Number, 1: Jewish Lunar Cycle, 17; Epact, —; Solar Cycle, 23: Roman Indiction, 5; Julian Period, 6,575.

Morning and Evening Stars.

Venus will be Evening Star until February 25, then Morning Star until December 10.

Mars will be Morning Star until October 5.

Jupiter will be Morning Star until March 13, then Evening Star until October 1.

Saturn will be Morning Star until March 9, then Evening Star until September 18, then Morning Star.

Mercury.

This Planet will be visible in the west soon after sunset, about February 7, June 3, and September 30; and in the east before sunrise, about March 29, July 29, and November 15.

Equinoxes and Solstices for 1862.

	D.	H.	M.
Vernal Equinox,.....	March	20	3 37 eve.
Summer Solstice,.....	June	21	0 12 eve.
Autumnal Equinox,.....	Sept.	23	2 20 morn.
Winter Solstice,.....	Dec.	21	8 12 eve.

The Solar System.

The SUN is the source of light and heat to our system. Its true diameter is upwards of 837,000 miles; its bulk is 1,384,000 times greater than the earth, and 700 times greater than that of all the planets and satellites together. It revolves on its axis in about 25 days 7 hours and 48 minutes.

MERCURY is the nearest planet to the Sun, being about 36,890,000 miles from it. It performs its revolution round the Sun in 87 days 23 hours, which is the length of its year. The diameter of Mercury is about 2,950 miles; its bulk 1-16th of the Earth.

VENUS.—Distance from the Sun 68,600,000 miles; the length of its year is 224 days 16 hours; the rotation on its axis is 23 hours 21 minutes. Its diameter is about 7,800 miles; its bulk is about 9-10ths that of the Earth.

THE EARTH is also one of the planets that revolve about the Sun. Its mean distance is about 95,000,000 miles, and its diameter about 7,912 miles.

MARS.—Distance from the Sun 145,205,000 miles; the length of its year is 686 days 23½ hours; its true diameter is about 4,500 miles, which is rather more than half the diameter of the Earth.

THE ASTEROIDS.—Very small planets, between the orbits of Mars and Jupiter. Up to this time 62 have been discovered, of which Vesta, Juno, Ceres and Pallas, are the largest; but all are invisible to the naked eye. They revolve at a distance of two or three hundred millions of miles from the Sun, and in periods of from three to five years.

JUPITER.—Mean distance from the Sun 495,917,000 miles; performs its revolution in 4,334 days 15 hours; its true diameter is 88,000 miles, and its bulk is 1,281 times that of the Earth. Length of its day, 9 hours and 56 minutes. Jupiter has four satellites or moons.

SATURN.—Distance from the Sun, above 909,000,000 miles; the length of its year is 10,755 days; its true diameter is 73,000 miles; its bulk is 95 times that of the Earth. Saturn has eight satellites, and is also surrounded with a double ring.

URANUS.—Mean distance from the Sun about 1,829,000,000 miles; it performs its revolution in about 84 years. This planet has six satellites.

NEPTUNE.—The most remote and lately discovered planet, is 2,864,000,000 of miles from the Sun. It is 35,000 miles in diameter; revolves around the Sun in 164 years; and has at least one satellite.—CHRISTIAN ALMANAC.

Duration of the Seasons, etc.

	D.	H.	M.
Sun in Winter Signs,.....	89	1	10
Sun in Spring Signs,.....	92	20	35
Sun in Summer Signs,.....	93	14	8
Sun in Autumnal Signs,.....	89	17	52
Tropical Year,.....	365	5	45
Sun North of Equator,.....	186	10	43
Sun South of Equator,.....	178	19	2

Note.—The Sun's declination in the Tables for each month, for the instant his centre is on the meridian of Washington.

MOON'S PHASES.		Boston.		N. York.		Wash'ton		Sun on Meridian or Noon Mark.			
	D	H	M	H	M	H	M	D	H	M	S
FIRST QUARTER,	7	6	2 e	5	50 e	5	39 e	1	12	3	58
FULL MOON,	15	9	12 e	8	59 e	8	47 e	9	12	7	31
THIRD QUARTER,	23	1	53 m	1	41 m	1	29 m	17	12	10	28
NEW MOON,	29	10	7 e	9	55 e	9	43 e	25	12	12	40

DAY OF MONTH.	DAY OF WEEK.	Sun's declens. S.	CALENDAR				CALENDAR				CALENDAR			
			For Boston, N. England, New-York State, Michigan, Wiscon., Iowa and Oregon.				For N. York City, Philadelphia, Conn., New Jersey, Penn'a, Ohio, Indiana and Illinois.				For Washington, Mary'd, Virg'a, Kent'y, Miss'r'i, and California.			
			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets.	MOON sets.	
		° ' "	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M
1	W	22 59 30	7 30	4 38	6 16	morn.	7 25	4 43	6 19	9 24	7 19	4 49	6 24	
2	T	22 54 10	7 30	4 39	7 28	0 38	7 25	4 44	7 31	10 9	7 19	4 50	7 34	
3	F	22 48 23	7 30	4 40	8 38	1 23	7 25	4 45	8 40	10 48	7 19	4 51	8 41	
4	S	22 42 9	7 30	4 41	9 44	2 12	7 25	4 46	9 44	11 31	7 19	4 52	9 45	
5	E	22 35 27	7 30	4 41	10 47	2 45	7 26	4 46	10 47	morn	7 19	4 52	10 46	
6	M	22 28 19	7 30	4 42	11 48	3 29	7 25	4 47	11 46	0 15	7 19	4 53	11 44	
7	T	22 20 44	7 30	4 43	morn	4 12	7 25	4 48	morn	0 58	7 19	4 54	morn	
8	W	22 12 43	7 30	4 44	0 49	5 0	7 25	4 49	0 46	1 46	7 19	4 55	0 43	
9	T	22 4 16	7 30	4 45	1 48	5 50	7 25	4 50	1 45	2 36	7 19	4 56	1 41	
10	F	21 55 23	7 29	4 46	2 47	6 44	7 24	4 51	2 42	3 30	7 19	4 57	2 38	
11	S	21 46 5	7 29	4 47	3 45	7 40	7 24	4 52	3 40	4 26	7 18	4 58	3 35	
12	E	21 36 21	7 29	4 48	4 41	8 38	7 24	4 53	4 36	5 24	7 18	4 59	4 30	
13	M	21 26 12	7 28	4 49	5 32	9 30	7 23	4 54	5 26	6 16	7 18	5 0	5 20	
14	T	21 15 39	7 28	4 50	6 18	10 22	7 23	4 55	6 13	7 8	7 17	5 1	6 7	
15	W	21 4 41	7 27	4 52	rises	11 4	7 22	4 57	rises	7 50	7 17	5 2	rises	
16	T	20 53 18	7 27	4 53	5 53	11 48	7 22	4 58	5 57	8 34	7 16	5 3	6 10	
17	F	20 41 32	7 26	4 54	7 0	ev 33	7 21	4 59	7 2	9 19	7 16	5 4	7 5	
18	S	20 20 23	7 25	4 56	8 8	1 13	7 20	5 1	8 9	9 59	7 16	5 6	8 10	
19	E	20 16 50	7 25	4 57	9 15	1 51	7 20	5 2	9 15	10 37	7 15	5 7	9 15	
20	M	20 3 54	7 24	4 58	10 24	2 32	7 19	5 3	10 23	11 18	7 14	5 8	10 21	
21	T	19 50 36	7 23	4 59	11 35	3 20	7 18	5 4	11 32	ev 6	7 14	5 9	11 30	
22	W	19 36 55	7 22	5 1	morn	4 11	7 18	5 5	morn	0 57	7 13	5 10	morn	
23	T	19 22 53	7 22	5 2	0 48	5 10	7 17	5 6	0 44	1 56	7 12	5 11	0 34	
24	F	19 8 29	7 21	5 3	2 2	6 19	7 16	5 7	1 57	3 5	7 12	5 12	1 45	
25	S	18 53 44	7 20	5 4	3 13	7 30	7 16	5 8	3 7	4 16	7 11	5 13	3 2	
26	E	18 33 38	7 19	5 5	4 18	8 40	7 15	5 9	4 12	5 26	7 10	5 14	4 6	
27	M	18 23 12	7 19	5 7	5 16	9 44	7 14	5 11	5 11	6 30	7 9	5 15	5 5	
28	T	18 7 26	7 18	5 8	6 4	10 39	7 13	5 12	5 59	7 25	7 9	5 16	5 54	
29	W	17 51 20	7 17	5 9	sets	11 26	7 13	5 13	sets	8 12	7 8	5 17	sets	
30	T	17 34 55	7 16	5 11	6 16	morn	7 12	5 15	6 19	8 58	7 7	5 19	6 21	
31	F	17 18 12	7 15	5 12	7 24	0 12	7 11	5 16	7 25	9 39	7 7	5 20	7 26	

True Time.

Two kinds of time are used in Almanacs; Clock or Mean-time in some, and Apparent or Sun-time in others. Clock-time is always right, while Sun-time varies every day. People generally suppose it is 12 o'clock when the sun is due south, or at a properly made noon-mark. But this is a mistake. The sun is seldom on the meridian at 12 o'clock; indeed, this is the case only on four days of the year,

viz: April 15, June 15, Sept. 1, and Dec. 24. In this Almanac, as in most other Almanacs, the time used is Clock-time. The time when the sun is on the meridian or at the noon-mark, is also given to the nearest second, for the 1st, 9th, 17th, and 25th days of each month, at the right hand of the top of each Calendar page.

This affords a ready means of obtaining correct time and for setting a clock by using

MOON'S PHASES.		Boston.	N. York.	Wash'ton	Sun on Meridian or Noon Mark.			
	D	H M	H M	H M	D	H M S		
FIRST QUARTER,.....	6	3 27 e	3 15 e	3 3 e	1	12 13 55		
FULL MOON,.....	14	0 22 e	0 10 e	11 58 m	9	12 14 30		
THIRD QUARTER,.....	21	9 27 m	9 15 m	9 3 m	17	12 14 15		
NEW MOON,.....	28	0 5 e	11 53 m	11 41 m	25	12 13 16		

DAY OF MONTH.	DAY OF WEEK.	Sun's declens. S.	CALENDAR				CALENDAR				CALENDAR			
			For Boston, N. England, New-York State, Mi- chigan, Wiscon., Iowa and Oregon.				For N. York City, Phi- ladelphia, Conn., New Jersey, Penn'a, Ohio, Indiana and Illinois.				For Washington, Mary'ld, Virg'a, Kent'y, Miss'ri, and California.			
			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets	MOON sets.	
		° ' "	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M
1	S	17 1 10	7 14	5 14	8 29	0 53	7 10	5 18	8 29	10 17	7 6	5 22	8 29	
2	E	16 43 51	7 12	5 15	9 32	1 31	7 9	5 19	9 31	10 53	7 5	5 23	9 30	
3	M	16 26 14	7 11	5 17	10 33	1 57	7 8	5 20	10 31	11 33	7 4	5 24	10 29	
4	T	16 8 20	7 10	5 18	11 35	2 47	7 7	5 21	11 32	morn	7 3	5 25	11 29	
5	W	15 50 10	7 9	5 19	morn	3 31	7 6	5 22	morn	0 17	7 2	5 26	morn	
6	T	15 31 43	7 8	5 21	0 36	4 18	7 5	5 24	0 32	1 4	7 1	5 27	0 27	
7	F	15 13 1	7 7	5 22	1 34	5 8	7 4	5 25	1 29	1 54	7 0	5 28	1 23	
8	S	14 54 3	7 6	5 24	2 30	6 8	7 3	5 26	2 25	2 54	6 59	5 29	2 19	
9	E	14 34 51	7 5	5 25	3 23	7 4	7 2	5 28	3 17	3 50	6 58	5 30	3 11	
10	M	14 15 24	7 3	5 26	4 12	8 5	7 0	5 29	4 6	4 51	6 57	5 31	4 0	
11	T	13 55 43	7 2	5 27	4 49	9 52	6 59	5 30	4 44	5 48	6 56	5 32	4 39	
12	W	13 35 48	7 1	5 29	5 32	9 55	6 58	5 32	5 28	6 41	6 55	5 34	5 23	
13	T	13 15 40	7 0	5 30	6 5	10 41	6 56	5 33	6 2	7 27	6 54	5 35	5 59	
14	F	12 55 19	6 58	5 31	rises	11 21	6 55	5 34	rises	8 7	6 53	5 36	rises	
15	S	12 34 46	6 57	5 32	7 3	ev 5	6 54	5 35	7 3	8 51	6 51	5 37	7 4	
16	E	12 14 0	6 55	5 33	8 14	0 47	6 53	5 36	8 13	9 33	6 50	5 38	8 12	
17	M	11 53 3	6 54	5 34	9 25	1 28	6 51	5 37	9 22	10 14	6 49	5 39	9 20	
18	T	11 31 54	6 52	5 36	10 37	2 10	6 50	5 38	10 34	10 56	6 48	5 40	10 31	
19	W	11 10 35	6 51	5 37	11 50	3 0	6 49	5 39	11 46	11 46	6 47	5 41	11 42	
20	T	10 49 5	6 49	5 39	morn	3 56	6 47	5 41	morn	ev 42	6 45	5 42	morn	
21	F	10 27 24	6 48	5 40	1 3	5 10	6 46	5 42	0 58	1 56	6 44	5 43	0 53	
22	S	10 5 34	6 47	5 41	2 10	6 11	6 44	5 43	2 4	2 57	6 43	5 44	1 59	
23	E	9 43 35	6 45	5 43	3 9	7 22	6 43	5 45	3 4	4 8	6 42	5 46	2 58	
24	M	9 21 27	6 43	5 44	3 59	8 29	6 41	5 46	3 54	5 15	6 40	5 47	3 49	
25	T	8 59 10	6 42	5 45	4 40	9 28	6 39	5 47	4 36	6 14	6 39	5 48	4 31	
26	W	8 36 45	6 41	5 46	5 15	10 20	6 38	5 48	5 12	7 6	6 38	5 49	5 8	
27	T	8 14 13	6 39	5 47	5 43	11 0	6 37	5 49	5 41	7 46	6 36	5 50	5 39	
28	F	7 51 33	6 37	5 48	sets	11 40	6 36	5 49	sets	8 26	6 34	5 51	sets	

a noon-mark, adding or subtracting as the sun is slow or fast.

Old-fashioned Almanacs, which use apparent time, give the rising and setting of the sun's centre, and make no allowance for the effect of refraction of the sun's rays by the atmosphere. The more modern and improved Almanacs, which use Clock-time, give the rising and setting of the sun's upper limb, and duly allow for refraction. The practice of setting time-pieces by the rising or setting of the sun or moon is not strictly correct, as the unevenness of the earth's surface and inter-

vening objects, such as hills and forests, near the points of rising and setting, occasion a deviation in every place, from the time expressed in the Almanac, which time is adapted to a smooth, level horizon. The only means of keeping correct time is by the use of a noon-mark, or a meridian line.

Leap-Year.

Every year the number of which is divisible by 4 without a remainder, is a leap-year, except the last year of the century, which is a leap-year only when divisible by 400 without a remainder. Thus, 1900 will not be leap-year.

MOON'S PHASES.		Boston.	N. York.	Wash'ton	Sun on Meridian or Noon Mark.			
	D	H M	H M	H M	D	H M S		
FIRST QUARTER,	8	0 37 e	0 25 e	0 13 e	1	12 12 32		
FULL MOON,	16	0 33 m	0 21 m	0 9 m	9	12 10 42		
THIRD QUARTER,	22	5 5 e	4 53 e	4 41 e	17	12 8 28		
NEW MOON,	30	3 1 m	2 49 m	2 37 m	25	12 6 2		

DAY OF MONTH.	DAY OF WEEK.	Sun's declens.	CALENDAR				CALENDAR				CALENDAR			
			For Boston, N. England, New-York State, Michigan, Wiscon., Iowa and Oregon.				For N. York City, Philadelphia, Conn., New Jersey, Penn'a, Ohio, Indiana and Illinois.				For Washington, Mary'ld, Virg'a, Kent'y, Miss'ri, and California.			
			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets.	MOON sets.	
		° ' "	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M
1	S	7 28 47	6 35	5 50	7 16	morn	6 35	5 50	7 15	9 6	6 33	5 52	7 15	
2	E	7 5 54	6 33	5 51	8 19	0 20	6 33	5 51	8 17	9 45	6 31	5 53	8 15	
3	M	6 42 55	6 32	5 53	9 22	0 59	6 32	5 53	9 19	10 21	6 30	5 54	9 16	
4	T	6 19 51	6 30	5 54	10 22	1 35	6 30	5 54	10 18	10 58	6 29	5 55	10 14	
5	W	5 56 42	6 29	5 55	11 22	2 12	6 29	5 55	11 17	11 41	6 27	5 56	11 12	
6	T	5 33 28	6 27	5 56	morn	2 55	6 27	5 56	morn	morn	6 26	5 57	morn	
7	F	5 10 10	6 26	5 58	0 15	3 52	6 26	5 58	0 10	0 38	6 25	5 58	0 5	
8	S	4 46 48	6 24	5 59	1 13	4 34	6 24	5 59	1 7	1 20	6 24	5 59	1 2	
9	E	4 23 22	6 23	6 0	2 3	5 31	6 23	6 0	1 57	2 17	6 22	6 0	1 52	
10	M	3 59 53	6 21	6 1	2 47	6 30	6 21	6 1	2 42	3 16	6 20	6 1	2 37	
11	T	3 36 21	6 19	6 2	3 27	7 32	6 19	6 2	3 23	4 18	6 18	6 2	3 18	
12	W	3 12 47	6 17	6 3	4 2	8 29	6 17	6 3	3 59	5 15	6 17	6 3	3 55	
13	T	2 49 10	6 15	6 5	4 33	9 22	6 15	6 4	4 30	6 8	6 15	6 4	4 28	
14	F	2 25 32	6 14	6 6	6 2	10 10	6 14	6 5	6 0	6 56	6 14	6 5	5 58	
15	S	2 1 52	6 12	6 7	rises	10 54	6 12	6 6	rises	7 40	6 13	6 6	rises	
16	E	1 38 12	6 10	6 8	7 5	11 35	6 10	6 7	7 3	8 21	6 11	6 7	7 2	
17	M	1 14 30	6 9	6 9	8 22	ev	21 6	9 6	8 8	19 9	6 10	6 8	8 16	
18	T	0 50 48	6 7	6 10	9 38	1 8	6 7	6 9	9 34	9 54	6 8	6 9	9 30	
19	W	0 27 6	6 5	6 11	10 50	1 54	6 5	6 10	10 46	10 40	6 6	6 10	10 41	
20	T	0 3 25	6 3	6 13	morn	2 47	6 3	6 12	11 57	11 33	6 5	6 11	11 51	
21	F	N. 20 16	6 2	6 14	0 2	3 48	6 2	6 13	morn	ev 34	6 3	6 12	morn	
22	S	0 43 56	6 0	6 15	1 4	4 54	6 0	6 14	58	1 40	6 2	6 13	0 53	
23	E	1 7 35	5 59	6 17	1 56	6 3	5 59	6 15	1 51	2 49	6 1	6 14	1 46	
24	M	1 31 12	5 57	6 18	2 41	7 7	5 58	6 16	2 36	3 53	5 59	6 15	2 31	
25	T	1 54 47	5 55	6 19	3 16	8 9	5 56	6 17	3 12	4 55	5 57	6 16	3 9	
26	W	2 18 19	5 53	6 20	3 47	9 4	5 55	6 18	3 44	5 50	5 56	6 17	3 42	
27	T	2 41 49	5 52	6 21	4 12	9 52	5 54	6 19	4 12	6 38	5 54	6 18	4 10	
28	F	3 5 15	5 51	6 22	4 38	10 34	5 52	6 20	4 37	7 20	5 53	6 19	4 37	
29	S	3 28 38	5 49	6 23	5 24	11 26	5 51	6 21	5 25	8 12	5 52	6 20	5 26	
30	E	3 51 56	5 47	6 24	sets	11 47	5 49	6 22	sets	8 33	5 50	6 21	sets	
31	M	4 15 11	5 45	6 25	8 9	morn	5 47	6 23	8 6	9 13	5 48	6 22	8 2	

The Milky Way.

That irregular stream of faint cloudy light which may be seen on clear moonless nights, by the naked eye, forming a circle entirely round the heavens—is supposed to be the remoter parts of the group of stars in which our sun is enveloped. To a spectator at a distant point in the heavens it may appear as a small annular nebula, or as a thin stratum of

starry light, covering but a small spot in the sky.

In the constellation Argo Navis, is a vast nebular cluster, in which from 2,000 to 6,000 stars have been revealed by the telescope, besides large nebulous tracts which no telescope has yet resolved into stars. This nebula is seen through the Milky Way, but is supposed to lie at an immeasurable distance beyond it.

4th MONTH.

APRIL, 1862.

30 DAYS.

MOON'S PHASES.		Boston.	N. York.	Wash'ton	Sun on Meridian or Noon Mark.			
	D	H M	H M	H M	D	H M S		
FIRST QUARTER,	7	7 28 m	7 16 m	7 4 m	1	12 3 54		
FULL MOON,	14	10 18 m	10 6 m	9 54 m	9	12 1 34		
THIRD QUARTER,	21	1 19 m	1 7 m	0 55 m	17	11 59 29		
NEW MOON,	28	6 42 e	6 30 e	6 19 e	25	11 57 50		

DAY OF MONTH	DAY OF WEEK	Sun's declens N.	CALENDAR				CALENDAR				CALENDAR			
			For Boston, N. England, New-York State, Michigan, Wiscon., Iowa and Oregon.				For N. York City, Philadelphia, Conn., New Jersey, Penn'a, Ohio, Indiana and Illinois.				For Washington, Mary'ld, Virg'a, Kent'y, Miss'ri, and California.			
			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets.	MOON sets.	
		° ' "	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	
1	T	4 38 21	5 43	6 26	9 15	0 27	5 45	6 24	9 11	9 51	5 46	6 22	9 6	
2	W	5 1 25	5 41	6 27	10 8	1 5	5 42	6 25	10 3	10 30	5 44	6 23	9 57	
3	T	5 24 25	5 40	6 28	11 3	1 44	5 41	6 26	10 57	11 12	5 43	6 24	10 52	
4	F	5 47 18	5 38	6 29	11 54	2 26	5 39	6 27	11 49	11 59	5 41	6 25	11 43	
5	S	6 10 5	5 36	6 30	morn	3 13	5 37	6 28	morn	morn	5 39	6 25	morn	
6	W	6 32 46	5 34	6 31	0 41	4 4	5 35	6 29	0 36	0 50	5 38	6 26	0 30	
7	M	6 55 20	5 32	6 32	1 22	4 56	5 33	6 30	1 17	1 42	5 37	6 27	1 12	
8	T	7 17 47	5 30	6 33	2 7	5 54	5 31	6 31	2 3	2 40	5 35	6 28	1 58	
9	W	7 40 7	5 29	6 34	2 30	6 53	5 30	6 32	2 27	3 39	5 33	6 29	2 24	
10	T	8 2 19	5 27	6 35	3 0	7 48	5 28	6 33	2 58	4 35	5 31	6 30	2 56	
11	F	8 24 22	5 25	6 36	3 28	8 45	5 26	6 34	3 27	5 31	5 29	6 31	3 26	
12	S	8 46 17	5 24	6 37	3 54	9 36	5 25	6 35	3 54	6 22	5 28	6 32	3 55	
13	W	9 8 4	5 22	6 38	4 24	10 24	5 24	6 36	4 25	7 10	5 27	6 33	4 27	
14	M	9 29 41	5 21	6 39	rises	11 9	5 22	6 37	rises	7 55	5 25	6 34	rises	
15	T	9 51 9	5 19	6 40	8 30	11 59	5 21	6 38	8 25	8 45	5 24	6 35	8 21	
16	W	10 12 27	5 17	6 41	9 44	ev 51	5 20	6 39	9 39	9 37	5 23	6 36	9 34	
17	T	10 33 35	5 16	6 42	10 53	1 43	5 18	6 40	10 48	10 29	5 21	6 37	10 42	
18	F	10 54 33	5 15	6 43	11 52	2 38	5 16	6 41	11 47	11 24	5 20	6 38	11 41	
19	S	11 15 21	5 13	6 44	morn	3 40	5 15	6 42	morn	ev 26	5 19	6 39	morn	
20	W	11 35 57	5 12	6 46	0 39	4 41	5 13	6 44	0 34	1 27	5 17	6 40	0 29	
21	M	11 56 22	5 10	6 47	1 16	5 44	5 11	6 45	1 13	2 30	5 15	6 41	1 9	
22	T	12 16 35	5 8	6 48	1 49	6 43	5 10	6 46	1 47	3 29	5 14	6 42	1 44	
23	W	12 36 37	5 6	6 49	2 16	7 38	5 9	6 47	2 14	4 24	5 13	6 43	2 13	
24	T	12 56 26	5 4	6 51	2 40	8 29	5 7	6 48	2 40	5 15	5 11	6 44	2 39	
25	F	13 16 2	5 3	6 52	3 6	9 17	5 6	6 49	3 7	6 3	5 10	6 45	3 7	
26	S	13 35 26	5 2	6 53	3 31	10 1	5 5	6 50	3 33	6 47	5 9	6 46	3 34	
27	W	13 54 36	5 1	6 54	3 57	10 40	5 3	6 51	3 59	7 26	5 7	6 47	4 2	
28	M	14 13 32	4 59	6 56	sets	11 18	5 2	6 52	sets	8 4	5 6	6 48	sets	
29	T	14 32 14	4 57	6 57	8 1	11 58	5 1	6 53	7 56	8 44	5 4	6 49	7 51	
30	W	14 50 42	4 56	6 58	8 56	morn	5 0	6 54	8 51	9 26	5 3	6 50	8 26	

Nebulæ.

"I wonder as I gaze. That stream of light
Undimmed, unquenched—just as I see it
now—

Has issued from those dazzling points thro'
years

That run far back into eternity.

Exhaustless flood! forever spent, renewed
Forever!"

A nebula is a cloudy spot of light in the
sky, invisible to the naked eye, and which
the most powerful telescope cannot in all

cases resolve into the stars which compose
it. There are between one and two thou-
sand nebulae noted in Herschel's Cata-
logue. They are supposed to be immensely
remote beyond the fixed stars; and if they
are each composed of multitudes of stars,
how vast must be the system, the combined
light of whose thousands of suns appears only
as a faint haze, and has required thousands
of years to reach us!

Nebulae vary exceedingly, both in apparent

MOON'S PHASES.				Boston.	N. York.	Wash'ton	Sun on Meridian or Noon Mark.			
		D	H M	H M	H M	H M	D	H M S		
FIRST QUARTER,.....		6	10 40 e	10 28 e	10 16 e		1	11 56 56		
FULL MOON,.....		13	6 16 e	6 4 e	5 52 e		9	11 56 14		
THIRD QUARTER,		20	10 54 m	10 42 m	10 31 m		17	11 56 8		
NEW MOON,.....		28	10 42 m	10 30 m	10 18 m		25	11 56 38		

DAY OF MONTH.	DAY OF WEEK.	Sun's declens. N.	CALENDAR				CALENDAR				CALENDAR			
			For Boston, N. England, New-York State, Michigan, Wiscon., Iowa and Oregon.				For N. York City, Philadelphia, Conn., New Jersey, Penn'a, Ohio, Indiana and Illinois.				For Washington, Mary'd, Virg'a, Kent'y, Miss'ri, and California.			
			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets.	MOON sets.	
		° ' "	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M
1	T	15 8 55	4 54	6 59	9 49	0 40	4 59	6 55	9 44	10 9	5 26	6 52	9 38	
2	F	15 26 53	4 53	7 0	10 37	1 23	4 58	6 56	10 31	10 46	5 16	6 53	10 26	
3	S	15 44 36	4 51	7 1	11 19	2 0	4 57	6 57	11 14	11 33	5 06	6 54	11 9	
4	☾	16 2 3	4 50	7 2	11 58	2 47	4 56	6 58	11 53	morn	4 59	6 55	11 49	
5	M	16 19 14	4 49	7 3	morn	3 36	4 55	6 59	morn	0 22	4 58	6 56	morn	
6	T	16 36 9	4 48	7 4	0 31	4 25	4 54	7 0	0 27	1 11	4 57	6 56	0 24	
7	W	16 52 48	4 47	7 5	1 0	5 16	4 53	7 1	0 57	2 22	4 56	6 57	0 55	
8	T	17 9 9	4 46	7 6	1 27	6 10	4 52	7 2	1 26	2 56	4 55	6 58	1 25	
9	F	17 25 13	4 45	7 7	1 54	7 8	4 51	7 3	1 53	3 54	4 54	6 59	1 53	
10	S	17 41 0	4 44	7 8	2 21	8 5	4 50	7 4	2 22	4 51	4 53	7 0	2 22	
11	☾	17 56 29	4 43	7 9	2 50	9 2	4 49	7 5	2 53	5 48	4 52	7 1	2 55	
12	M	18 11 40	4 42	7 10	3 24	9 58	4 48	7 6	3 28	6 44	4 51	7 2	3 31	
13	T	18 26 33	4 41	7 11	rises	10 52	4 47	7 7	rises	7 38	4 50	7 3	rises	
14	W	18 41 7	4 40	7 12	8 33	11 43	4 45	7 8	8 27	8 29	4 49	7 4	8 22	
15	T	18 55 23	4 39	7 13	9 37	ev 41	4 44	7 9	9 32	9 27	4 48	7 5	9 26	
16	F	19 9 19	4 38	7 14	10 33	1 35	4 43	7 10	10 28	10 21	4 47	7 6	10 23	
17	S	19 22 56	4 37	7 15	11 15	2 27	4 42	7 11	11 11	11 13	4 46	7 7	11 6	
18	☾	19 36 14	4 36	7 16	11 51	3 23	4 41	7 12	11 48	ev 9	4 45	7 7	11 45	
19	M	19 49 11	4 35	7 17	morn	4 18	4 40	7 13	morn	1 4	4 44	7 8	morn	
20	T	20 1 49	4 35	7 18	0 20	5 11	4 39	7 14	0 19	1 57	4 44	7 9	0 17	
21	W	20 14 6	4 34	7 19	0 46	6 7	4 38	7 15	0 45	2 53	4 43	7 10	0 44	
22	T	20 26 2	4 33	7 20	1 12	6 59	4 37	7 16	1 12	3 45	4 42	7 10	1 12	
23	F	20 37 37	4 32	7 21	1 35	7 49	4 36	7 17	1 36	4 35	4 42	7 11	1 38	
24	S	20 48 51	4 31	7 22	2 0	8 40	4 35	7 18	2 2	5 26	4 41	7 12	2 5	
25	☾	20 59 44	4 30	7 23	2 29	9 26	4 35	7 19	2 32	6 12	4 40	7 13	2 36	
26	M	21 10 15	4 29	7 24	2 59	10 11	4 34	7 20	3 3	6 57	4 40	7 14	3 7	
27	T	21 20 24	4 28	7 25	3 35	10 56	4 33	7 21	3 40	7 42	4 39	7 14	3 45	
28	W	21 30 11	4 28	7 26	sets	11 33	4 33	7 22	sets	8 19	4 38	7 15	sets	
29	T	21 39 36	4 27	7 27	8 35	morn	4 32	7 23	8 30	9 5	4 38	7 16	8 24	
30	F	21 48 38	4 26	7 28	9 18	0 19	4 31	7 24	9 13	9 47	4 37	7 16	9 7	
31	S	21 57 17	4 26	7 28	9 57	1 1	4 31	7 25	9 52	10 26	4 37	7 17	9 48	

size and in form. Some are elliptical, others annular, and many are globular. In the tail of Scorpio is a cometary nebula. In Sobieski's Shield is a singular oval nebula containing two small distinct stars. And in the constellation Cygnus is a globular nebula, with a single distinct star in the centre. Another in Auriga, surrounds an equilateral triangle of three minute stars.

In the right foot of Andromeda is a beau-

tiful elliptical nebula, called by Sir John Herschel "a wonderful object." The centre is black, with a small star at each end. It is believed to be of immense size, and to be in shape a ring, seen sideways.

The nebular cluster appears like a small hazy star to the naked eye, but in a good telescope shines with a lustre truly astonishing.

In the constellation Orion is a remarkable nebula, the diameter of which must be at

MOON'S PHASES.		Boston.	N. York.	Wash'ton	Sun on Meridian or Noon Mark.			
	D	H M	H M	H M	D	H	M	S
FIRST QUARTER,	5	9 59 m	9 47 m	9 35 m	1	11	57	31
FULL MOON,	12	1 33 m	1 21 m	1 9 m	9	11	58	54
THIRD QUARTER,	18	10 28 e	10 16 e	10 4 e	17	12	0	33
NEW MOON,	27	2 10 m	1 58 m	1 46 m	25	12	2	17

DAY OF MONTH.	DAY OF WEEK.	Sun's declens. N.	CALENDAR				CALENDAR				CALENDAR			
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			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets.	MOON sets.	
		° ' "	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M
1	E	22 5 34	4 25	7 29	10 31	1 40	4 31	7 24	10 28	11 8	4 36	7 18	10 24	
2	M	22 13 27	4 24	7 30	11 3	2 12	4 30	7 25	10 59	11 52	4 36	7 19	10 56	
3	T	22 20 57	4 24	7 30	11 30	3 6	4 30	7 25	11 28	morn	4 35	7 19	11 27	
4	W	22 28 4	4 23	7 31	11 55	3 52	4 29	7 26	11 55	0 38	4 35	7 20	11 54	
5	T	22 34 47	4 23	7 32	morn	4 41	4 29	7 27	morn	1 27	4 35	7 20	morn	
6	F	22 41 7	4 23	7 33	0 22	5 33	4 28	7 27	0 22	2 19	4 34	7 21	0 23	
7	S	22 47 3	4 22	7 33	0 49	6 29	4 28	7 28	0 51	3 15	4 34	7 21	0 52	
8	E	22 52 34	4 22	7 34	1 19	3 32	4 28	7 28	1 22	4 18	4 34	7 22	1 25	
9	M	22 57 42	4 22	7 35	1 55	8 34	4 28	7 29	1 58	5 20	4 34	7 22	2 3	
10	T	23 2 26	4 22	7 35	2 38	9 36	4 28	7 29	2 43	6 22	4 34	7 23	2 48	
11	W	23 6 45	4 22	7 36	3 31	10 36	4 28	7 30	3 37	7 22	4 34	7 24	3 40	
12	T	23 10 40	4 22	7 37	rises	11 30	4 28	7 30	rises	8 16	4 34	7 25	rises	
13	F	23 14 10	4 22	7 37	9 7	ev 29	4 28	7 31	9 2	9 15	4 34	7 25	8 58	
14	S	23 17 16	4 22	7 38	9 47	1 12	4 28	7 31	9 43	10 8	4 34	7 26	9 40	
15	E	23 19 57	4 22	7 38	10 20	2 8	4 28	7 32	10 18	10 54	4 33	7 27	10 15	
16	M	23 22 13	4 22	7 38	10 48	2 57	4 28	7 32	10 47	11 43	4 33	7 27	10 46	
17	T	23 24 5	4 22	7 39	11 14	3 46	4 28	7 33	11 14	ev 32	4 33	7 28	11 14	
18	W	23 25 32	4 22	7 39	11 39	4 34	4 28	7 33	11 40	1 20	4 33	7 28	11 40	
19	T	23 26 34	4 23	7 39	morn	5 21	4 29	7 34	morn	2 7	4 33	7 28	morn	
20	F	23 27 12	4 23	7 39	0 4	6 16	4 29	7 34	0 6	3 2	4 34	7 28	0 8	
21	S	23 27 24	4 23	7 39	0 32	7 8	4 29	7 34	0 35	3 54	4 34	7 28	0 38	
22	E	23 27 12	4 23	7 40	1 1	8 1	4 29	7 34	1 4	4 47	4 34	7 29	1 9	
23	M	23 26 35	4 23	7 40	1 35	8 54	4 29	7 35	1 40	5 40	4 34	7 29	1 45	
24	T	23 25 33	4 24	7 40	2 15	9 45	4 30	7 35	2 20	6 31	4 35	7 29	2 25	
25	W	23 24 6	4 24	7 40	2 59	10 32	4 30	7 35	3 4	7 18	4 35	7 29	3 10	
26	T	23 22 15	4 24	7 40	3 49	11 13	4 30	7 35	3 55	7 59	4 35	7 29	4 0	
27	F	23 19 59	4 25	7 40	sets	11 56	4 30	7 35	sets	8 42	4 35	7 29	sets	
28	S	23 17 18	4 25	7 40	8 33	morn	4 31	7 35	8 29	9 25	4 36	7 29	8 24	
29	E	23 14 13	4 25	7 40	9 6	0 39	4 31	7 35	9 3	10 5	4 36	7 29	9 0	
30	M	23 10 43	4 25	7 40	9 35	1 19	4 31	7 35	9 32	10 43	4 36	7 29	9 30	

least 19,000,000,000 of miles; and if, as is altogether probable, it lies at a vast distance beyond the most distant stars, its magnitude must be inconceivably great. It is like a universe by itself, immeasurably remote beyond the universe heretofore known.

And yet it is but one of many such, disclosed to the telescopic eye of modern science, and proclaiming as nothing else can the infinite power of Him at whose word they sprang into being.

To Ascertain the Length of the Day and Night,

At any time of the year, add twelve hours to the time of the sun's setting, and from the sum subtract the time of rising, for the length of the day. Subtract the time of setting from twelve hours, and to the remainder add the time of rising next morning, for the length of the night.

These rules are equally true for apparent time.

MOON'S PHASES.		Boston.	N. York.	Wash'ton	Sun on Meridian or Noon Mark.			
	D	H M	H M	H M	D	H M S		
FIRST QUARTER,	4	6 6 e	5 54 e	5 42 e	1	12 3 30		
FULL MOON,	11	8 54 m	8 42 m	8 30 m	9	12 4 53		
THIRD QUARTER,	18	4 29 e	0 17 e	0 5 e	17	12 5 49		
NEW MOON,	26	4 21 e	4 9 e	3 57 e	25	12 6 12		

DAY OF MONTH.	DAY OF WEEK.	Sun's declens. N.	CALENDAR				CALENDAR				CALENDAR			
			For Boston, N. England, New-York State, Michigan, Wiscon., Iowa and Oregon.				For N. York City, Philadelphia, Conn., New Jersey, Penn'a, Ohio, Indiana and Illinois.				For Washington, Mary'd, Virg'a, Kent'y, Miss'ri, and California.			
			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets.	MOON sets.	
		° ' "	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M
1	T	23 6 49	4 26	7 40	10 0	1 57	4 31	7 35	9 59	11 21	4 37	7 29	9 58	
2	W	23 2 31	4 26	7 40	10 25	2 35	4 32	7 35	10 25	morn	4 37	7 29	10 26	
3	T	22 57 48	4 27	7 40	10 52	3 20	4 32	7 35	10 53	0 6	4 38	7 29	10 54	
4	F	22 52 42	4 27	7 39	11 20	4 7	4 33	7 34	11 22	0 53	4 38	7 28	11 25	
5	S	22 47 12	4 28	7 39	11 52	5 0	4 33	7 34	11 55	1 46	4 39	7 28	11 59	
6	EE	22 41 18	4 29	7 39	morn	5 59	4 34	7 34	morn	2 45	4 40	7 28	morn	
7	M	22 35 1	4 29	7 39	0 31	7 5	4 34	7 34	0 35	3 51	4 40	7 28	0 40	
8	T	22 28 20	4 30	7 38	1 17	8 14	4 35	7 33	1 22	5 0	4 41	7 27	1 27	
9	W	22 21 16	4 31	7 38	2 16	9 24	4 36	7 33	2 21	6 10	4 42	7 27	2 27	
10	T	22 13 49	4 31	7 38	3 24	10 27	4 37	7 33	3 29	7 13	4 42	7 27	3 34	
11	F	22 51 59	4 32	7 37	rises	11 19	4 38	7 32	rises	8 5	4 43	7 26	rises	
12	S	21 37 46	4 33	7 37	8 16	ev 12	4 39	7 32	8 13	8 58	4 44	7 26	8 10	
13	EE	21 49 10	4 34	7 36	8 48	1 0	4 39	7 31	8 46	9 46	4 45	7 25	8 45	
14	M	21 40 12	4 35	7 36	9 15	1 43	4 40	7 31	9 15	10 29	4 45	7 25	9 14	
15	T	21 30 52	4 36	7 35	9 42	2 25	4 41	7 30	9 43	11 11	4 46	7 24	9 43	
16	W	21 21 10	4 37	7 34	10 7	3 9	4 42	7 29	10 9	11 55	4 47	7 24	10 10	
17	T	21 11 6	4 38	7 34	10 35	3 54	4 43	7 29	10 37	ev 40	4 48	7 23	10 40	
18	F	21 0 40	4 39	7 33	11 3	4 42	4 43	7 28	11 7	1 28	4 49	7 23	11 10	
19	S	21 49 53	4 39	7 32	11 34	5 33	4 44	7 27	11 39	2 19	4 50	7 22	11 43	
20	EE	20 38 44	4 40	7 32	morn	6 28	4 45	7 27	mo'n	3 14	4 50	7 22	morn	
21	M	20 27 15	4 41	7 31	0 12	7 27	4 46	7 26	0 17	4 13	4 51	7 21	0 22	
22	T	20 15 25	4 42	7 30	0 56	8 23	4 47	7 25	1 1	5 9	4 52	7 20	1 7	
23	W	20 3 15	4 43	7 29	1 43	9 17	4 48	7 24	1 48	6 3	4 53	7 19	1 54	
24	T	19 50 45	4 44	7 28	2 38	10 7	4 49	7 23	2 43	6 53	4 53	7 18	2 48	
25	F	19 37 54	4 45	7 27	3 35	10 52	4 49	7 22	3 40	7 38	4 54	7 17	3 45	
26	S	19 24 44	4 46	7 26	sets	11 29	4 50	7 22	sets	8 15	4 55	7 16	sets	
27	EE	19 11 15	4 47	7 25	7 38	morn	4 51	7 21	7 35	8 58	4 56	7 15	7 33	
28	M	18 57 27	4 48	7 24	8 5	0 12	4 52	7 20	8 4	9 38	4 56	7 14	8 2	
29	T	18 43 20	4 49	7 23	8 31	0 52	4 53	7 19	8 31	10 16	4 57	7 14	8 31	
30	W	18 28 55	4 50	7 22	8 57	1 30	4 54	7 18	8 58	10 54	4 58	7 14	8 59	
31	T	18 14 11	4 51	7 21	9 24	2 8	4 55	7 17	9 26	11 38	4 59	7 13	9 28	

Thickness of the Earth's Crust.

From the average of numerous experiments, the temperature is found to increase one degree for every 60 feet the earth is penetrated. By this law, the heat at the depth of 60 or 70 miles would reduce to a state of fusion most of the mineral substances known to us. Hence it has been concluded that the centre of the earth is a molten and fluid mass. In view, however, of the increased

conducting power of the primitive rocks, and of certain astronomical arguments, it is probable that the solid crust of the earth cannot be less than from 200 to 500 miles in thickness.

The Polestar 4,000 Years ago.

The following from Sir John Herschel's Outlines of Astronomy, shows the changes in the celestial pole in 4,000 years:

"At the date of the erection of the Great

MOON'S PHASES.		Boston.	N. York.	Wash'ton	Sun on Meridian or Noon Mark.			
	D	H M	H M	H M	D	H M S		
FIRST QUARTER,	2	0 12 m	12 0 e	11 48 e	1	12 6 3		
FULL MOON,	9	5 19 e	4 57 e	4 45 e	9	12 5 15		
THIRD QUARTER,	17	5 13 m	4 51 m	4 39 m	17	12 3 50		
NEW MOON,	25	4 56 m	4 44 m	4 32 m	25	12 1 53		

DAY OF MONTH.	DAY OF WEEK.	Sun's declens. N.	CALENDAR For Boston, N. England, New-York State, Mi- chigan, Wiscon., Iowa and Oregon.				CALENDAR For N. York City, Phi- ladelphia, Conn., New Jersey, Penn'a, Ohio, Indiana and Illinois.				CALENDAR For Washington, Mary'ld, Virg'a, Kent'y, Miss'ri, and California.			
			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets.	MOON sets.	
			H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M
1	F	17 59 10	4 52	7 20	9 54	2 52	4 56	7 16	9 57	morn	5 0	7 12	10 0	
2	S	17 43 51	4 53	7 19	10 30	3 41	4 57	7 15	10 34	0 27	5 1	7 11	10 39	
3	E	17 28 15	4 54	7 18	11 13	4 38	4 58	7 14	11 18	1 24	5 2	7 10	11 23	
4	M	17 12 22	4 55	7 16	morn	5 43	4 59	7 13	morn	2 29	5 2	7 9	morn	
5	T	16 56 12	4 56	7 15	0 4	6 53	5 0	7 12	0 9	3 39	5 3	7 8	0 15	
6	W	16 39 46	4 57	7 14	1 6	8 5	5 1	7 11	1 11	4 51	5 4	7 7	1 17	
7	T	16 23 4	4 58	7 13	2 14	9 14	5 2	7 10	2 19	6 0	5 5	7 6	2 25	
8	F	16 6 6	4 59	7 11	3 28	10 14	5 3	7 9	3 32	7 0	5 6	7 4	3 37	
9	S	15 48 53	5 0	7 10	rises	11 1	5 4	7 8	rises	7 47	5 7	7 3	rises	
10	E	15 31 24	5 1	7 9	7 14	11 49	5 5	7 6	7 13	8 35	5 8	7 1	7 12	
11	M	15 13 41	5 2	7 8	7 42	ev 35	5 6	7 5	7 41	9 21	5 9	7 0	7 41	
12	T	14 55 42	5 3	7 7	8 9	1 34	5 7	7 3	8 10	10 0	5 10	6 59	8 11	
13	W	14 37 29	5 4	7 5	8 35	1 53	5 8	7 2	8 37	10 39	5 11	6 58	8 39	
14	T	14 19 3	5 5	7 4	9 4	2 32	5 9	7 0	9 7	11 18	5 12	6 57	9 10	
15	F	14 0 22	5 6	7 2	9 35	3 17	5 10	6 59	9 39	ev 3	5 13	6 55	9 43	
16	S	13 41 28	5 7	7 1	10 11	4 4	5 11	6 58	10 16	0 50	5 14	6 54	10 21	
17	E	13 22 21	5 8	7 0	10 51	4 57	5 12	6 57	10 56	1 43	5 15	6 53	11 1	
18	M	13 3 1	5 9	6 58	11 37	5 52	5 13	6 55	11 42	2 38	5 16	6 52	11 48	
19	T	12 43 28	5 10	6 56	morn	6 52	5 14	6 54	morn	3 38	6 17	6 50	morn	
20	W	12 23 43	5 11	6 55	0 28	7 51	5 15	6 53	0 33	4 37	5 18	6 49	0 39	
21	T	12 3 47	5 12	6 54	1 24	8 47	5 16	6 51	1 29	5 33	5 19	6 48	1 34	
22	F	11 43 38	5 14	6 52	2 24	9 37	5 17	6 50	2 28	6 23	5 20	6 46	2 33	
23	S	11 23 19	5 15	6 51	3 27	10 15	5 18	6 49	3 30	7 11	5 21	6 45	3 33	
24	E	11 2 49	5 16	6 49	4 30	10 53	5 19	6 47	4 33	7 49	5 21	6 43	4 35	
25	M	10 42 8	5 17	6 48	sets	11 43	5 20	6 45	sets	8 29	5 22	6 42	sets	
26	T	10 21 17	5 18	6 46	7 1	morn	5 21	6 43	7 1	9 11	5 23	6 41	7 2	
27	W	10 0 16	5 19	6 44	7 28	0 25	5 22	6 41	7 30	9 50	5 24	6 39	7 21	
28	T	9 39 6	5 20	6 42	7 59	1 4	5 23	6 40	8 1	10 33	5 25	6 38	8 4	
29	F	9 17 47	5 21	6 41	8 33	1 47	5 24	6 38	8 36	11 17	5 26	6 36	8 40	
30	S	8 56 18	5 22	6 39	9 13	2 31	5 25	6 36	9 18	morn	5 27	6 34	9 23	
31	E	8 34 42	5 23	6 37	10 3	3 26	5 26	6 34	10 8	0 12	5 28	6 33	10 13	

Pyramid of Gizeh, which precedes the present epoch by nearly 4,000 years, the longitudes of all the stars were less by 55 deg. 45 min. than at present. Calculating, from this datum, the place of the pole of the heavens among the stars, it will be found to fall near α Draconis; its distance from that star being 3 deg. 41 min. 25 sec. This being the most conspicuous star in the immediate neighborhood, was therefore the Polestar at that

epoch. The latitude of Gizeh being just 30 deg. north, and consequently the altitude of the North Pole there also 30 deg., it follows that the star in question must have had at its lower culmination at Gizeh, an altitude of 26 deg. 15 min. 35 sec.

Now it is a remarkable fact, that of the nine pyramids still existing at Gizeh, six—including all the largest—have the narrow passages by which alone they can be entered—all

MOON'S PHASES.		Boston.		N. York.		Wash'ton		Sun on Meridian or Noon Mark.			
	D	H	M	H	M	H	M	D	H	M	S
FIRST QUARTER,	1	5	33 m	5	21 m	5	9 m	1	11	59	50
FULL MOON,	8	3	13 m	3	1 m	2	50 m	9	11	57	12
THIRD QUARTER,	15	11	38 e	11	26 e	11	14 e	17	11	54	24
NEW MOON,	23	4	13 e	4	1 e	3	49 e	25	11	51	37
FIRST QUARTER,	30	11	26 m	11	14 m	11	2 m				

DAY OF MONTH.	DAY OF WEEK.	Sun's declens N.	CALENDAR				CALENDAR				CALENDAR			
			For Boston, N. England, New-York State, Mi- chigan, Wiscon., Iowa and Oregon.				For N. York City, Phi- ladelphia, Conn., New Jersey, Penn'a, Ohio, Indiana and Illinois.				For Washington, Mary'd, Virg'a, Kent'y, Miss'ri, and California.			
			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets	MOON sets.	
		° ' "	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	
1	M	8 12 57	5 24	6 36	10 57	4 27	5 27	6 33	11 3	1 13	5 29	6 31	11 9	
2	T	7 51 4	5 26	6 35	morn	5 33	5 28	6 32	morn	2 19	5 30	6 30	morn	
3	W	7 29 4	5 27	6 33	0 3	6 45	5 29	6 30	0 8	3 31	5 31	6 28	0 13	
4	T	7 6 57	5 28	6 31	1 13	7 55	5 30	6 29	1 18	4 41	5 32	6 27	1 22	
5	F	6 44 42	5 29	6 30	2 26	8 59	5 31	6 27	2 30	5 45	5 33	6 25	2 33	
6	S	6 22 21	5 30	6 28	3 38	9 55	5 32	6 26	3 40	6 41	5 34	6 24	3 43	
7	EE	5 59 54	5 31	6 26	4 47	10 41	5 33	6 24	4 49	7 27	5 35	6 23	4 50	
8	M	5 37 21	5 32	6 25	rises	11 20	5 34	6 23	rises	8 6	5 35	6 21	rises	
9	T	5 14 42	5 33	6 23	6 36	ev 3	5 35	6 21	6 38	8 49	5 36	6 20	6 39	
10	W	4 51 58	5 34	6 21	7 4	0 44	5 36	6 19	7 7	9 30	5 37	6 18	7 10	
11	T	4 29 9	5 35	6 19	7 35	1 23	5 36	6 18	7 38	10 9	5 38	6 17	7 42	
12	F	4 6 15	5 36	6 17	8 9	2 0	5 37	6 16	8 14	10 46	5 39	6 15	8 18	
13	S	3 43 16	5 37	6 16	8 48	2 43	5 38	6 14	8 53	11 29	5 40	6 13	8 59	
14	EE	3 20 13	5 38	6 14	9 31	3 32	5 39	6 12	9 36	ev 18	5 40	6 12	9 42	
15	M	2 57 7	5 39	6 12	10 20	4 25	5 40	6 10	10 25	1 11	5 41	6 10	10 31	
16	T	2 33 57	5 40	6 11	11 14	5 23	5 41	6 8	11 19	2 9	5 42	6 9	11 24	
17	W	2 10 44	5 41	6 9	morn	6 18	5 42	6 7	morn	3 4	5 43	6 7	morn	
18	T	1 47 28	5 42	6 7	0 12	7 16	5 43	6 5	0 16	4 2	5 44	6 5	0 21	
19	F	1 24 10	5 43	6 5	1 11	8 9	5 44	6 4	1 15	4 55	5 44	6 4	1 19	
20	S	1 0 49	5 44	6 4	2 15	9 2	5 45	6 2	2 17	5 48	5 45	6 2	2 20	
21	EE	0 37 27	5 45	6 2	3 17	9 50	5 46	6 1	3 19	6 36	5 46	6 1	3 21	
22	M	0 14 4	5 46	6 0	4 26	10 34	5 47	5 59	4 26	7 20	5 47	5 59	4 26	
23	T	S. 9 21	5 47	5 58	sets	11 15	5 48	5 57	sets	8 1	5 48	5 57	sets	
24	W	0 32 46	5 48	5 56	6 0	11 58	5 49	5 55	6 2	8 44	5 49	5 55	6 4	
25	T	0 56 12	5 49	5 54	6 32	morn	5 50	5 53	6 35	9 30	5 50	5 53	6 39	
26	F	1 19 37	5 50	5 52	7 13	0 44	5 51	5 52	7 17	10 17	5 51	5 52	7 22	
27	S	1 43 1	5 51	5 50	7 59	1 31	5 52	5 50	8 4	11 6	5 52	5 51	8 9	
28	EE	2 6 25	5 53	5 49	8 54	2 20	5 53	5 49	8 59	morn	5 53	5 49	9 5	
29	M	2 29 48	5 54	5 46	9 57	3 18	5 54	5 47	10 2	0 4	5 54	5 47	10 8	
30	T	2 53 9	5 55	5 45	11 4	4 20	5 55	5 45	11 9	1 6	5 55	5 45	11 14	

which open out on the Northern faces of their respective pyramids—inclined downward at an angle as follows:

	DEG.	MIN.
1. Pyramid of Cheops,	26	41
2. Pyramid of Cephren,	25	55
3. Pyramid of Mycerinus,	26	2
4.	27	0
5.	27	12
6.	28	0

Mean, 26 47

At the bottom of every one of these passages, therefore, the Polestar must have been visible at its lower culmination, a circumstance which can hardly be supposed to have been unintentional, and was doubtless connected—perhaps superstitiously—with the astronomical observations of that star, of whose proximity to the pole at the epoch of the erection of these wonderful structures we are thus furnished with a monumental record of the most imperishable nature."

MOON'S PHASES.		Boston.		N. York.		Wash'ton		Sun on Meridian or Noon Mark.			
	D	H	M	H	M	H	M	D	H	M	S
FULL MOON,.....	7	4	3 e	3	51 e	3	39 e	1	11	49	38
THIRD QUARTER,	15	6	58 e	6	46 e	6	34 e	9	11	47	17
NEW MOON,.....	23	2	52 m	2	40 m	2	29 m	17	11	45	24
FIRST QUARTER,.....	29	7	0 e	6	48 e	6	36 e	25	11	44	11

DAY OF MONTH.	DAY OF WEEK.	Sun's declens. S.	CALENDAR				CALENDAR				CALENDAR			
			For Boston, N. England, New-York State, Michigan, Wiscon., Iowa and Oregon.				For N. York City, Philadelphia, Conn., New Jersey, Penn'a, Ohio Indiana and Illinois.				For Washington, Mary'd, Virg'a, Kent'y, Miss'r'i, and California.			
			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets.	MOON sets.	
		° ' "	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	
1	W	3 16 29	5 56	5 43	morn	5 26	5 56	5 43	morn	2 12	5 56	5 44	morn	
2	T	3 39 46	5 57	5 42	0 16	6 33	5 57	5 42	0 19	3 19	5 57	5 42	0 23	
3	F	4 3 0	5 58	5 40	1 26	7 37	5 58	5 41	1 29	4 23	5 58	5 41	1 31	
4	S	4 26 12	5 59	5 39	2 36	8 36	5 59	5 39	2 38	5 22	5 59	5 39	2 39	
5	EE	4 49 20	6 1	5 38	3 42	9 26	6 0	5 37	3 43	6 12	6 0	5 38	3 43	
6	M	5 12 25	6 2	5 36	4 49	10 13	6 1	5 36	4 49	6 59	6 1	5 37	4 48	
7	T	5 35 26	6 3	5 34	rises	10 54	6 2	5 34	rises	7 40	6 2	5 35	rises	
8	W	5 58 23	6 4	5 33	5 35	11 30	6 3	5 33	5 38	8 16	6 3	5 34	5 41	
9	T	6 21 14	6 5	5 31	6 8	cv 14	6 4	5 31	6 12	9 0	6 4	5 32	6 16	
10	F	6 44 1	6 6	5 29	6 43	0 54	6 5	5 29	6 48	9 40	6 5	5 31	6 53	
11	S	7 6 43	6 8	5 28	7 26	1 35	6 6	5 28	7 31	10 21	6 6	5 30	7 37	
12	EE	7 29 19	6 9	5 26	8 13	2 16	6 7	5 26	8 18	11 2	6 7	5 29	8 24	
13	M	7 51 49	6 10	5 24	9 5	3 2	6 8	5 25	9 10	11 48	6 8	5 27	9 15	
14	T	8 14 12	6 11	5 22	10 0	3 51	6 9	5 23	10 5	ev 37	6 9	5 25	10 10	
15	W	8 36 29	6 12	5 20	10 59	4 43	6 10	5 22	11 3	1 29	6 10	5 24	11 7	
16	T	8 58 38	6 13	5 19	11 59	5 38	6 11	5 20	morn	2 24	6 11	5 22	morn	
17	F	9 20 40	6 14	5 17	morn	6 31	6 12	5 19	0 2	3 17	6 12	5 20	0 5	
18	S	9 42 33	6 15	5 16	1 2	7 29	6 13	5 17	1 4	4 15	6 13	5 19	1 6	
19	EE	10 4 19	6 17	5 14	2 6	8 19	6 14	5 16	2 8	5 5	6 14	5 17	2 9	
20	M	10 25 55	6 18	5 13	3 12	9 13	6 15	5 15	3 12	5 59	6 15	5 16	3 12	
21	T	10 47 22	6 19	5 11	4 21	10 2	6 16	5 13	4 20	6 48	6 16	5 15	4 19	
22	W	11 8 40	6 21	5 10	sets	10 50	6 18	5 12	sets	7 36	6 17	5 14	sets	
23	T	11 29 48	6 22	5 8	5 8	11 36	6 19	5 10	5 11	8 22	6 18	5 13	5 16	
24	F	11 50 45	6 23	5 7	5 51	morn	6 20	5 8	5 55	9 14	6 19	5 12	6 0	
25	S	12 11 31	6 24	5 5	6 45	0 28	6 21	5 7	6 50	10 7	6 20	5 10	6 55	
26	EE	12 32 6	6 25	5 4	7 48	1 21	6 22	5 5	7 53	10 59	6 21	5 9	7 58	
27	M	12 52 29	6 27	5 2	8 57	2 13	6 24	5 4	9 1	11 57	6 22	5 7	9 6	
28	T	13 12 40	6 28	5 1	10 7	3 11	6 25	5 3	10 11	morn	6 23	5 5	10 15	
29	W	13 32 39	6 29	5 0	11 18	4 10	6 26	5 2	11 21	0 56	6 24	5 4	11 24	
30	T	13 52 24	6 21	4 58	morn	5 10	6 27	5 0	morn	1 56	6 25	5 3	morn	
31	F	14 11 57	6 32	4 57	0 28	6 10	6 28	4 59	0 30	2 56	6 26	5 2	0 32	

Planet Between Mercury and the Sun.

Within a century and a half, twenty-one reliable observations have been had of transits of Mercury over the sun's disk. In these a progressive error of small amount was noted, which led astronomers to conclude there must be some small planetary body within the orbit of Mercury. Studying therefore, attentively the small spots upon the sun, an observer 50 miles from Paris, named Lescarbault, has discovered the planet in question.

Telegraphic Weather Reports

Are daily sent to the Smithsonian Institution at Washington, from almost all parts of the Union; and the state of the weather being indicated on a large map in the public hall, by cards of different colors, the spectator can observe where storms are occurring, and trace their progress annually toward the east. Thus, from the Cincinnati and St. Louis reports, the state of the weather at Washington may be foretold twelve hours in advance.

MOON'S PHASES.		Boston.	N. York.	Wash'ton	Sun on Meridian or Noon Mark.			
	D	H M	H M	H M	D	H	M	S
FULL MOON,.....	6	8 4 m	7 52 m	7 41 m	1	11	43	44
THIRD QUARTER,.....	14	1 26 e	1 14 e	1 2 e	9	11	44	0
NEW MOON,.....	21	1 30 e	1 18 e	1 6 e	17	11	45	11
FIRST QUARTER,.....	28	5 18 m	5 6 m	4 54 m	25	11	47	15

DAY OF MONTH.	DAY OF WEEK.	Sun's declens. S.	CALENDAR				CALENDAR				CALENDAR			
			For Boston, N. England, New-York State, Mi- chigan, Wiscon., Iowa and Oregon.				For N. York City, Phi- ladelphia, Conn., New Jersey, Penn'a, Ohio, Indiana and Illinois.				For Washington, Mary'ld, Virg'a, Kent'y, Miss'ri, and California.			
			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets	MOON sets.	
		° ' "	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	
1	S	14 31 15	6 33	4 55	1 34	7 7	6 29	4 59	1 35	3 53	6 27	5 1	1 36	
2	E	14 50 20	6 34	4 54	2 40	8 2	6 30	4 58	2 40	4 48	6 28	5 0	2 39	
3	M	15 9 10	6 35	4 53	3 43	8 53	6 31	4 57	3 41	5 39	6 29	4 59	3 40	
4	T	15 27 45	6 36	4 52	4 16	9 41	6 32	4 56	4 43	6 27	6 30	4 58	4 41	
5	W	15 46 4	6 37	4 50	5 43	10 25	6 33	4 55	5 44	7 11	6 31	4 57	5 40	
6	T	16 4 8	6 39	4 49	rises	11 3	6 35	4 53	rises	7 49	6 32	4 56	rises	
7	F	16 21 57	6 40	4 48	5 22	11 45	6 36	4 52	5 27	8 31	6 33	4 55	5 32	
8	S	16 39 28	6 41	4 47	6 8	ev 30	6 38	4 50	6 13	9 16	6 35	4 54	6 18	
9	E	16 56 42	6 43	4 45	6 58	1 1	6 39	4 49	7 3	9 57	6 36	4 53	7 9	
10	M	17 13 40	6 44	4 44	7 52	1 51	6 40	4 48	7 57	10 37	6 37	4 52	8 2	
11	T	17 30 20	6 45	4 43	8 48	2 33	6 41	4 47	8 53	11 19	6 39	4 51	8 57	
12	W	17 46 41	6 47	4 42	9 48	3 20	6 43	4 46	9 51	ev 6	6 40	4 50	9 55	
13	T	18 2 44	6 48	4 41	10 47	4 7	6 44	4 45	10 50	0 53	6 41	4 49	10 52	
14	F	18 18 29	6 49	4 40	11 50	4 55	6 45	4 44	11 51	1 41	6 42	4 48	11 53	
15	S	18 33 54	6 51	4 39	morn	5 48	6 47	4 43	morn	2 34	6 43	4 47	morn	
16	E	18 48 59	6 52	4 38	0 53	6 42	6 48	4 42	0 54	3 28	6 44	4 46	0 55	
17	M	19 3 44	6 53	4 37	1 58	7 37	6 49	4 41	1 58	4 23	6 45	4 46	1 57	
18	T	19 18 9	6 54	4 36	3 8	8 35	6 50	4 40	3 6	5 21	6 46	4 45	3 4	
19	W	19 32 13	6 55	4 36	4 19	9 31	6 51	4 40	4 16	6 17	6 47	4 44	4 13	
20	T	19 45 56	6 56	4 35	5 34	10 28	6 52	4 39	5 31	7 14	6 48	4 44	5 26	
21	F	19 59 17	6 58	4 34	sets	11 19	6 54	4 38	sets	8 5	6 49	4 43	sets	
22	S	20 12 16	6 59	4 33	5 29	morn	6 55	4 38	5 34	9 2	6 50	4 42	5 39	
23	E	20 24 53	7 0	4 33	6 37	0 16	6 56	4 37	6 42	9 56	6 51	4 42	6 48	
24	M	20 37 7	7 1	4 32	7 50	1 10	6 57	4 36	7 54	10 46	6 52	4 41	7 59	
25	T	20 48 58	7 3	4 31	9 6	2 0	6 58	4 36	9 9	11 42	6 53	4 41	9 12	
26	W	21 0 26	7 4	4 31	10 17	2 56	6 59	4 35	10 19	morn	6 54	4 41	10 21	
27	T	21 11 30	7 5	4 30	11 26	3 49	7 0	4 34	11 27	0 35	6 55	4 41	11 28	
28	F	21 22 10	7 6	4 29	morn	4 43	7 1	4 34	morn	1 29	6 56	4 40	morn	
29	S	21 32 26	7 7	4 29	0 32	5 38	7 2	4 33	0 32	2 24	6 57	4 40	0 33	
30	E	21 42 17	7 9	4 29	1 27	6 31	7 4	4 33	1 26	3 17	6 58	4 40	1 25	

California Trees.

There are two large groves of mammoth trees in California, one near Mariposa, the other in Calaveras county. The latter, the smaller of the two, covers as much space as Boston Common, and encloses a hotel. At the entrance stand two sentinel trees, 25 feet apart, 60 feet in circumference, and 300 feet high. One tree is 93 feet in circumference, another 73 feet, and 310 feet high. A third is 327 feet high. In the Mariposa grove there

are 650 giant trees in less than a square mile, more than 100 of them measuring 50 feet or more in circumference, two measuring 100 each, and one 102. This latter raises its crown 80 feet higher than Bunker Hill Monument. There is a petrified cedar near Honey Lake, on the Eastern slope of the Sierras, which measures 42 feet in diameter at the butt, (about 120 feet in circumference,) and is over 600 feet long, besides an unknown length buried in the soil; for at the point

MOON'S PHASES.		Boston.	N. York.	Wash'ton	Sun on Meridian or Noon Mark.			
	D	H M	H M	H M	D	H	M	S
FULL MOON,	6	2 53 m	2 41 m	2 29 m	1	11	49	19
THIRD QUARTER,	14	5 49 m	5 37 m	5 25 m	9	11	52	39
NEW MOON,	21	0 20 m	0 8 m	11 56 e	17	11	56	27
FIRST QUARTER,	27	7 0 e	6 48 e	6 36 e	25	12	0	27

DAY OF MONTH.	DAY OF WEEK.	Sun's declens. S.	CALENDAR				CALENDAR				CALENDAR			
			For Boston, N. England, New-York State, Michigan, Wiscon., Iowa and Oregon.				For N. York City, Philadelphia, Conn., New Jersey, Penn'a, Ohio Indiana and Illinois.				For Washington, Mary'd, Virg'a, Kent'y, Miss'ri, and California.			
			SUN rises	SUN sets.	MOON sets.	H. W. Bost.	SUN rises	SUN sets.	MOON sets.	H. W. N. Y.	SUN rises	SUN sets.	MOON sets.	
		° ' "	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M
1	M	21 51 43	7 10	4 29	2 40	7 28	7 5	4 34	2 38	4 14	6 59	4 40	2 36	
2	T	22 0 43	7 11	4 29	3 41	8 18	7 6	4 34	3 38	5 4	7 0	4 39	3 36	
3	W	22 9 19	7 12	4 28	4 42	9 10	7 7	4 34	4 39	5 56	7 1	4 39	4 34	
4	T	22 17 29	7 13	4 28	5 40	9 58	7 8	4 33	5 35	6 44	7 2	4 39	5 31	
5	F	22 25 12	7 14	4 28	rises	10 42	7 9	4 33	rises	7 28	7 3	4 38	rises	
6	S	22 32 30	7 15	4 28	4 52	11 24	7 10	4 33	4 57	8 10	7 4	4 38	5 3	
7	E	22 39 21	7 16	4 28	5 45	ev 6	7 11	4 33	5 50	8 52	7 5	4 38	5 55	
8	M	22 45 46	7 17	4 28	6 42	0 46	7 12	4 33	6 46	9 32	7 6	4 38	6 51	
9	T	22 51 43	7 18	4 28	7 39	1 29	7 13	4 33	7 42	10 15	7 7	4 38	7 47	
10	W	22 57 14	7 19	4 28	8 39	2 5	7 14	4 33	8 42	10 51	7 8	4 38	8 45	
11	T	23 2 17	7 20	4 28	9 39	2 47	7 15	4 33	9 41	11 33	7 9	4 38	9 43	
12	F	23 6 53	7 21	4 28	10 40	3 31	7 15	4 33	10 41	ev 17	7 10	4 39	10 42	
13	S	23 11 1	7 22	4 28	11 43	4 15	7 16	4 33	11 43	1 1	7 10	4 39	11 43	
14	E	23 14 42	7 22	4 28	morn	5 6	7 17	4 34	morn	1 52	7 11	4 39	morn	
15	M	23 17 54	7 23	4 28	0 47	5 59	7 17	4 34	0 47	2 45	7 11	4 39	0 45	
16	T	23 20 39	7 24	4 28	1 56	6 59	7 18	4 34	1 53	3 45	7 12	4 39	1 51	
17	W	23 22 56	7 24	4 29	3 7	8 1	7 18	4 34	3 3	4 47	7 12	4 40	3 0	
18	T	23 24 44	7 25	4 29	4 20	9 7	7 19	4 35	4 16	5 53	7 13	4 40	4 11	
19	F	23 26 5	7 25	4 29	5 34	10 9	7 19	4 35	5 29	6 55	7 13	4 40	5 24	
20	S	23 26 57	7 26	4 30	sets	11 5	7 20	4 36	sets	7 51	7 14	4 41	sets	
21	E	23 27 20	7 26	4 30	5 23	morn	7 20	4 36	5 28	8 49	7 14	4 41	5 33	
22	M	23 27 16	7 27	4 31	6 41	0 3	7 21	4 37	6 44	9 43	7 15	4 42	6 48	
23	T	23 26 43	7 27	4 31	7 57	0 57	7 21	4 37	7 59	10 31	7 15	4 42	8 2	
24	W	23 25 41	7 28	4 32	9 10	1 45	7 22	4 38	9 12	11 17	7 16	4 43	9 13	
25	T	23 24 12	7 28	4 32	10 21	2 31	7 22	4 38	10 21	morn	7 16	4 43	10 21	
26	F	23 22 14	7 29	4 33	11 26	3 21	7 23	4 39	11 26	0 7	7 17	4 44	11 25	
27	S	23 19 48	7 29	4 34	morn	4 9	7 23	4 39	morn	0 55	7 17	4 45	morn	
28	E	23 16 54	7 29	4 34	0 31	5 0	7 24	4 40	0 29	1 46	7 18	4 45	0 27	
29	M	23 13 32	7 29	4 35	1 33	5 52	7 24	4 40	1 31	2 38	7 18	4 46	1 28	
30	T	23 9 43	7 30	4 36	2 35	6 49	7 25	4 41	2 31	3 35	7 19	4 47	2 27	
31	W	23 5 25	7 30	4 37	3 35	7 43	7 25	4 42	3 30	4 29	7 19	4 48	3 26	

where it is lost from sight it is still four feet in diameter. These trees are found, by actual count of the rings of some, to be over one thousand years old.

Sewing Machines.

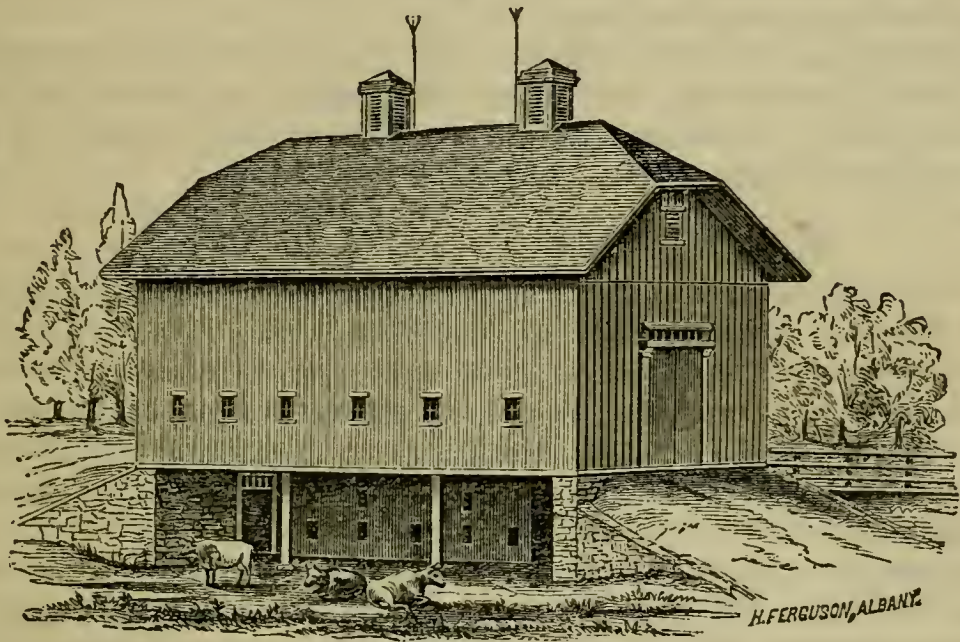
It was shown, before the Commissioner of Patents at Washington, that the annual sewing labor on ladies' and misses' gaiter boots and shoes made in Massachusetts, costs

\$2,500,000; and that it would cost \$10,000,000 to do the same work by hand. In the single article of shirts, were all that are worn in the United States made by machines, the annual saving would be over \$12,000,000; and in ready made clothing \$75,000,000.

Gold from Australia.

The annual shipments of Gold from Melbourne average at least \$45,000,000.

THE
ILLUSTRATED ANNUAL REGISTER
OF
RURAL AFFAIRS.



FARM BUILDINGS.



FIFTY farmers keep two leading points in view—first, to raise all they can from their lands; and secondly, to take good care of these products after they are raised. Or, as the old maxim has it in reversed order, they “keep all they can get, and get all they can;” not applying it, however, to their intercourse with men, but with their farms only.

They get all they can, by preserving and increasing the permanent fertility of their fields; and they keep all they get, by not wasting their crops from a want of shelter, nor their flocks by exposure to storms and cold.

The amount of waste occasioned by exposure is not estimated by careless managers. Cattle have been found to remain in better order in stables than in exposed places, on two-thirds of the food—one-third being consumed in sustaining animal warmth in open air. Milch cows, well protected, give about one-third more milk. For a herd of twenty cows, therefore, about ten tons of hay would be saved every winter, and at least \$25 worth of milk—

total, \$150. That part of the barn occupied by their stables, would not cost more than twice this sum. In other words, the stables would pay for themselves biennially. They would, in short, pay \$1,500 in ten years, besides interest; or with interest, about \$2,750—double the entire cost of a fine barn.

Northern sheep raisers find that the saving of life and the increase in the amount of mutton and wool, afforded by good shelter, will pay for the erection of buildings every two years.

By continuing the preceding estimates, it will be discovered that, taking every thing into account, the farmer who neglects to provide good farm buildings, sinks a handsome fortune every twenty years, greater or less, according to the extent of his operations.

ESTIMATING THE CAPACITY OF BARNS.

Very few farmers are aware of the precise amount of shelter needed for their crops, but lay their plans of out-buildings from vague conjecture or guessing. As a consequence, much of their products have to be stacked outside, after their buildings have been completed; and if additions are made, they must of necessity be put up at the expense of convenient arrangement. A brief example will show how the capacity of the barn may be accurately adapted to the size of the farm.

Suppose, for example, that the farm contains one hundred acres, of which ninety are good arable land; and that one-third each are devoted to meadow, pasture, and grain. Ten acres of the latter may be corn, stored in a separate building. The meadow should afford two tons per acre, and yield sixty tons; the sown grain, 20 acres, may yield a corresponding bulk of straw, or forty tons. The barn should, therefore, besides other matters, have a capacity for one hundred tons, or over one ton per acre as an average. Allowing 500 cubic feet for each ton (perhaps 600 would be nearer) it would require a bay or mow 40 feet long and 19 feet wide for a ton and a half to each foot of depth. If twenty feet high, it would hold about thirty tons. If the barn were forty feet wide, with eighteen feet posts, and eight feet of basement, about forty-five tons could be stowed away in a bay reaching from basement to peak. Two such bays, or equivalent space, would be required for the products of ninety well cultivated acres. Such a building is much larger than is usually allowed; and yet without it there must be a large waste, as every farmer is aware who stacks his hay out; or a large expenditure of labor in pitching and repitching sheaves of grain in thrashing.

In addition to this, as we have already seen, there should be ample room for the shelter of domestic animals. In estimating the space required, including feeding alleys, &c., a horse should have 75 square feet; a cow 45 feet; and sheep about 10 square feet each. The basement of a barn, therefore, 40 by 75 feet in the clear, will stable 30 cattle and 150 sheep, and a row of stalls across one end will afford room for eight horses. The thirty acres each

of pasture and meadow, and the ten acres of corn-fodder, already spoken of, with a portion of grain and roots, would probably keep about this number of animals, and consequently a barn with a basement of less size than 40 by 75 would be insufficient for the complete accommodation of such a farm in the highest state of cultivation.

FORM OF BARN BUILDINGS.

It has formerly been a practice, highly commended by writers, and adopted by farmers, to erect a series of small buildings in the form of a hollow square, affording an open space within this range, sheltered from severe winds. But later experience, corroborated by reason, indicates the superiority of a single large building. There is more economy in the materials for walls; more in the construction of roofs—a most expensive portion of farm structures; and a saving in the amount of labor, in feeding, thrashing, and transferring straw and grain, when all are placed more compactly together. The best barns are those with three stories; and nearly three times as much accommodation is obtained thus under a single roof, as with the old mode of erecting only low and small buildings.

An important object is to avoid needless labor in the transfer of the many tons of farm products which occupy a barn. This object is better secured by a three-story barn than by any other, where a side-hill will admit of its erection. The hay and grain are drawn directly to the upper floor, and nearly all is pitched downwards. If properly arranged, the grain is all thrashed on this floor, and both grain and straw go downwards—the straw to a stack or bay, and the grain through an opening into the granary below. Hay is thrown down through shoots made for this purpose to the animals below, and oats are drawn off through a tube to the horses' manger. The cleanings of the horse stables are cast through a trap door into the manure heap in the basement. These are the principal objects gained by such an arrangement; and as the labor of attendance must be repeated perpetually, it is very plain how great the saving must be over barns with only one floor, where hay, grain, manure, &c., have to be carried many feet horizontally, or thrown upward.

HOW TO PLAN A BARN.

The first thing the farmer should do, who is about to erect a barn, is to ascertain what accommodation he wants. To determine the amount of space, has already been pointed out. He should next make a list of the different apartments required, which he may select from the following, comprising most of the objects usually sought:

- | | |
|---------------------------------------|-------------------------------------|
| 1. Bay or mow for hay. | 8. Root cellar. |
| 2. Bay or mow for unthrashed grain. | 9. Room for heavy tools and wagons. |
| 3. Bay or mow for straw. | 10. Manure sheds. |
| 4. Thrashing floor. | 11. Granary. |
| 5. Stables for horses. | 12. Harness room. |
| 6. Stables for cattle, and calf pens. | 13. Cisterns for rain water, |
| 7. Shelter for sheep. | 14. Space for horse power. |

If these are placed all on one level, care should be taken that those parts oftenest used should be nearest of access to each other; and that arrangements be made for drawing with a cart or wagon in removing or depositing all heavy substances, as hay, grain, and manure. In filling the barn, for example, the wagon should go to the very spot where it is unloaded; the cart should pass in the rear of all stalls to carry off manure; and if many animals are fed in stables, the hay should be carted to the mangers, instead of doing all these labors by hand.

If there are two stories in the barn, the basement should contain,

- | | |
|------------------------|-----------------|
| 1. Stables for cattle. | 5. Manure shed. |
| 2. Shelter for sheep. | 6. Cistern. |
| 3. Root cellar. | 7. Horse power. |
| 4. Coarse tool room. | |

The second floor should contain,

- | | |
|----------------------------|------------------|
| 1. Bays for hay and grain. | 4. Granary. |
| 2. Thrashing floor. | 5. Harness room. |
| 3. Stables for horses. | |

For three stories, these should be so arranged that the basement may be similar to the two-story plan, and the second story should contain,

- | | |
|------------------------|------------------|
| 1. Bay for hay. | 3. Granary. |
| 2. Stables for horses. | 4. Harness room. |

The third or upper story,

- | | |
|-----------------------------|--|
| 1. Thrashing floor. | 3. Bays for grain, including space over floor. |
| 2. Continuation of hay bay. | 4. Openings to granary below. |

In all cases there should be ventilators, shoots for hay, ladders to ascend bays, and stairs to reach quickly every part; besides which every bin in the granary should be graduated like the chemists' assay-glass, so that the owner may by a glance at the figures marked inside, see precisely how many bushels there are within. A blackboard should be in every granary, for marking or calculating; one in the stable, to receive directions from the owner in relation to feeding; or keeping accounts of the same; and a third should face the thrashing floor, for recording any results.

Corn cribs require a free circulation of air, and open work for air large enough to admit rats and mice; they should, therefore, be separate buildings, placed on columns which these animals cannot ascend. Apartments for swine are likewise usually preferred in a separate building.

BASEMENTS.

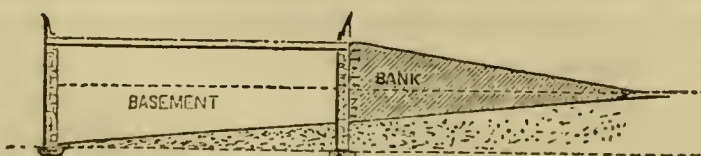


Fig. 1.

It may be laid down as a general rule, that every barn should have a basement. Its only cost is excavation and

walls. The building need not necessarily be on a hillside, as a moderate artificial mound and a short bridge will afford ready access by teams to the

floor above. A slope of two and a half feet only, will answer a good purpose; the two and a half feet of excavated earth will make a good embankment for wagon way. If this way is as long as the width of the barn, its first rise will be five feet above the bottom, as exhibited by fig. 1, the lower dotted line being the level of the cellar bottom, and the one next above, five feet above it.

If the ground is a dead level, (which rarely happens,) the cut, fig. 2, will show the manner of forming the embankment, connected with the barn by a short

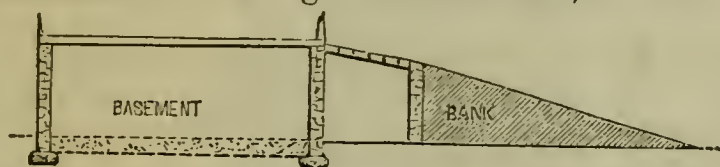


Fig. 2.

bridge. About one foot of earth is taken from the whole surface of the basement, and carted for the wagon way.

If the basement walls are built of stone, the security they afford the sills against moisture and decay will save enough to pay for excavation and constructing wagon way.

Whenever practicable, the basement should not be less than eight or nine feet high; the only exceptions may be where the ground is perfectly level. The posts of the upper story should be 16 feet high for small barns, and 19 or 20 feet for large ones. The same amount of roof being required in either case, it is a matter of economy to use high posts.

COST OF BARNS.

The following general rule may be adopted, subject to some variation in different localities, according to the price of lumber, labor, and economical management on the part of the builder:

A common, well built farm barn, not planed or painted, with stone basement, will cost \$1 for each two and a half to three square feet. For example, a barn measuring 35 by 50 feet, and containing 1750 square feet, will cost from \$585 to \$700. If planed and painted, and correspondingly finished, \$1 will pay for about two square feet; and it would consequently cost about \$875. Farmers who are about to plan and erect barns, will find this approximative rule, derived from a number of actual bills of cost, of considerable convenience.

DESIGNS FOR BARNS.

DESIGN I.

A BARN FOR FIFTY ACRES OR LESS.

The plan here given is sufficient for a farm containing fifty acres under cultivation, and yielding good crops, with general or mixed husbandry. For special departments of farming, it must be modified to apply to circumstances.

Fig. 4 is a plan of the principal floor. Being built on a moderately descending side-hill, the threshing floor is easily accessible through the wide

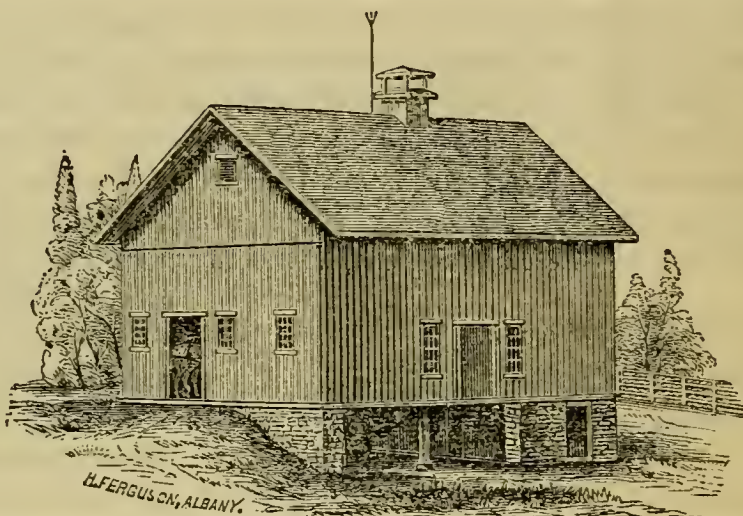


Fig. 3—PERSPECTIVE VIEW OF DESIGN I.

doors on the further side, and the wagon, when unloaded, is backed out. These doors should be each at least five feet wide, so as to give an opening of ten feet; and about twelve feet high, to allow ample space to drive in a load of hay. The door at the other end of the floor is about five feet wide, and is used for throwing out straw. A narrow window on each side of this door, and one with a row of single horizontal lights over the large doors, keep the floor well lighted, when stormy weather requires the doors to be shut.

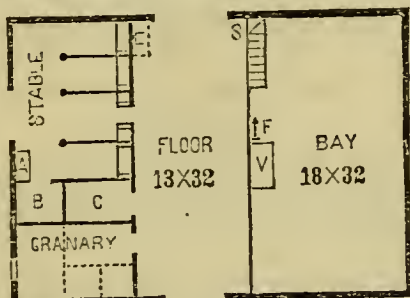


Fig. 4—PRINCIPAL FLOOR.

- A. A trap door, for throwing down manure.
- B. Closet for harness, saddle, buffalo skins, &c.
- C. Tool room.
- E. Trap door for straw and roots.
- F. Ladder to bay.
- V. Ventilator and hay shoot.
- S. Stairs to basement.

The bay, on the right, will hold at least one ton of hay for every foot of height, or some 20 or 25 in all. By marking the feet on one of the front posts, the owner may know, at any time, with some degree of accuracy, how many tons of hay he has in this bay, after it has become well settled. The upright shaft, V, serves at the same time to ventilate the stables below, and for throwing down hay directly in front of the cow stables. It should be made of planed boards inside, that the hay may fall freely, and for the same reason it should be slightly larger downwards. It should have a succession of board doors two feet or more square, hung on hinges so as to open downwards, through the openings of which the hay is thrown down for the animals. When not in use, these doors should be shut by turning upwards and buttoning fast. A register should be placed in this shaft, to regulate the amount of air in severe weather. This may be a horizontal door at the bottom, dropping open on hinges, and shut by hooking up closely or partially, on different pins.

Fig. 5 shows the form of the ventilator at the top of the building. It is

made of wood, except the four iron rods or bolts at the corners, and secures the advantages of Emerson's excellent cap, which causes the air to draw upward at all times when there is wind from any quarter. Fig. 6 is a section showing the interior.

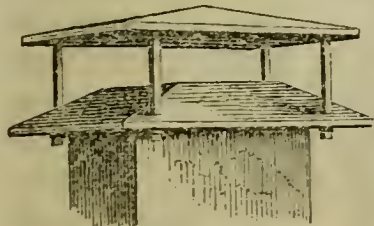


Fig. 5.

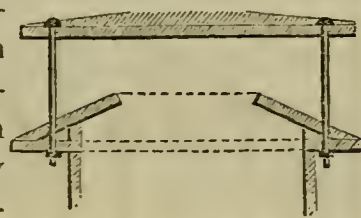


Fig. 6.

A fixed ladder, on the line between the bay and the floor, enables the attendant to ascend readily at any moment.

As a basement is usually too damp for horses, a stable large enough to hold five is placed on this floor. The middle stall will receive two horses to stand abreast; and being placed opposite to the door six feet wide, will readily admit a span in harness, for temporary feeding, which is often a great convenience. A narrow passage from this stall admits the attendant to the barn floor. A trap door at A. allows the cleanings of the stable to pass at once to the manure heap below.

These stalls are represented as only four feet wide. Five feet would probably be better, making but one narrow stall on each side the wide one, and allowing room for four horses in all. A door under the girth, at E, allows straw and roots to be discharged into the root cellar below—the roots being first deposited there, and then a few feet of straw upon them, protects from freezing.

The Tool Room, (Fig. 4, C.) A place for every thing, and every thing in its place, will save many hours of searching, many weary steps, and much

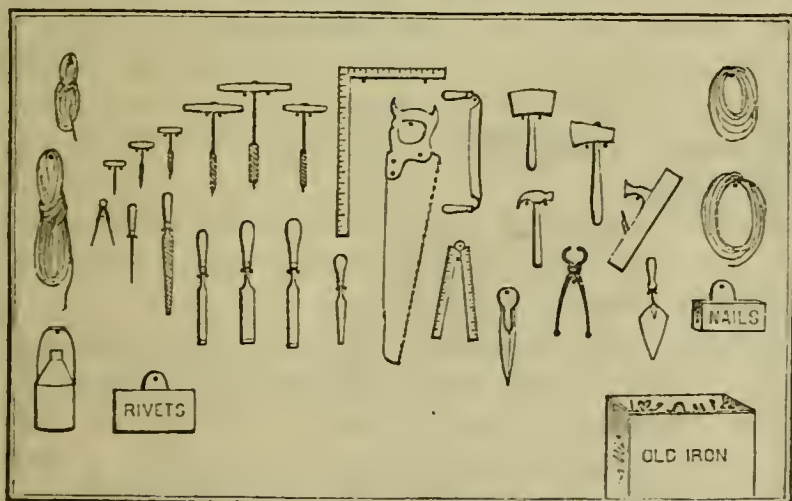


Fig. 7—INTERIOR OF TOOL ROOM—SMALL TOOLS.

vexation, every year. The tools should not only be in the room, but every one in its place, where the hand may be always laid on it in a moment. For this purpose they should be hung up against the wall, and be neatly arranged. Nearly every tool can be hung on a spike or pin, or between two

large nails. If hung perpendicularly, they will occupy less room, and may be quickly taken down and replaced. Fig. 7 shows the manner in which the smaller tools may be thus arranged; and fig. 8 exhibits the larger tools hung on the opposite wall of the same room. In order that each tool may be always in its place, the plan devised by Townsend Sharpless, of Phila-

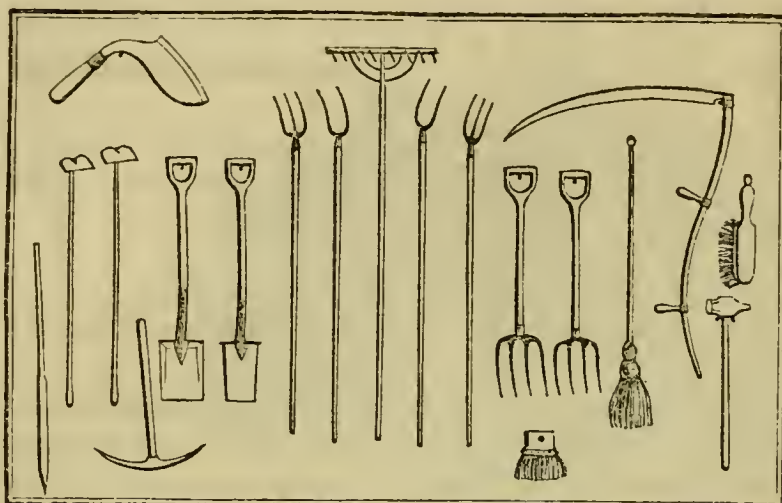


Fig. 8—INTERIOR OF TOOL ROOM—LARGE TOOLS.

should be put, but show at a moment if any has been left out of place. The consciousness that there is such a tell-tale in the tool room, will stimulate any careless laborer to return every thing which he takes out.

The Granary, 8 by 13 feet, contains three bins, which have a part of the front boards moveable or sliding, so that when all are in their place, they may be filled six feet high. They will hold, in all, about 350 bushels. The contents of each bin may be readily determined by measuring and multiplying the length, breadth, and depth, and dividing the number of cubic feet thus obtained by 56, and multiplying by 45. The result will be bushels. It will, therefore, be most convenient to make each bin even feet. A scale should be marked inside, showing the number of bushels at any height. Bags may be marked in the same way, after trial, with considerable accuracy, and save much trouble in measuring, for many purposes, but not for buying and selling. A short tube, with a slide to shut it, may pass downward from one or more of these bins, so that bags placed in a wagon in the shed below, may be easily and rapidly filled.

A bay for unthrashed grain occupies all the space over the horse stable, tool room, and granary; and moveable poles or platform over each end of the floor also admit a considerable quantity besides.

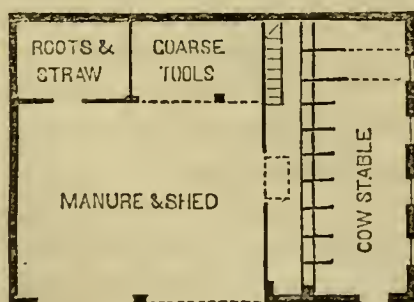


Fig. 9—BASEMENT.

The Basement, (Fig. 9.) This needs but little explanation. The cows are fed from the passage in front of them, into which the hay-shoot discharges, in front of which a door opens to the shed, for the ready feeding of animals outside. The two inner stalls shut with gates, and serve for calf pens when needed. Coarse implements, as sleds in summer, and wagons and carts in winter, may

occupy the inclosed space adjoining, entered by a common gate. If a lever horse power for thrashing is used, it may be placed in the "shed" in the

delphia, is the best. Hang each tool in its position; then draw its outline accurately on the board wall with pencil or chalk; then with a brush dipped in some dark colored paint, make a distinct representation of the shape of the tool. These outlines will not only show where the tool

basement; but it would be better to use a two horse endless chain power, which may be placed on the floor above, and used for thrashing, cutting stalks, and other purposes. The farmer may thus do his own thrashing, in winter and on stormy days, with the assistance of a hired man, not only thus saving much expense, but turning out a fresh supply of straw whenever needed. The cost of this barn, if built rough, would be about \$500; planed and painted, \$600 or \$700.

In order to prevent the bank of earth from crowding in the cellar wall, the latter should be made thick and substantial on the upper side.

DESIGN II.

BARN FOR SEVENTY-FIVE TO A HUNDRED ACRES.

(A view of which is placed at the head of the article on p. 125.)

This barn stands on a slight declivity, and is so constructed that a wagon may be driven through it, obviating the necessity of backing out. Its size is forty-two by sixty feet. (Its capacity may be increased to any extent by greater length.) The main floor is lighted by a long horizontal window over

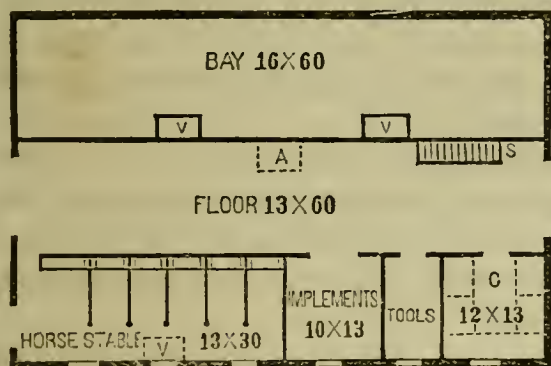


Fig. 11—PRINCIPAL FLOOR.

- A. Trap door and shoot for straw and chaff.
- G. Granary.
- V.V. Ventilators and hay shoots.
- S. Stairs to basement.

each double door; the trap door for straw turns down and buttons up under the girth; if desired, two more may be placed outside the ventilators. A smooth planed shoot below allows the straw to slide freely in the root and straw cellar below, and a cart of roots is dumped down this shoot. Roots will keep finely if a foot of straw is first thrown down, then several feet of roots, then a few additional feet of straw or chaff, to protect them from freezing.

There are two ventilators at the side of the bay, through which hay is thrown down into the feeding passage below; the mode of constructing these shafts is already described. A third is placed over the passage in the horse stable, for the purpose of ventilating only. They are made to unite at the

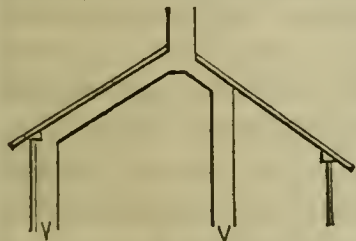
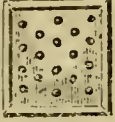


Fig. 12.

ridge of the barn by extending them up next to the roof, as shown by a section in Fig. 12. This bay contains 960 square feet, and will hold about forty tons of hay, or two tons for every foot of rise, when the hay is well settled; and if one of the ventilator shafts is marked in feet outside, the owner may see at any time nearly how much he has on hand. A fixed ladder for ascending it may be placed near A.

The Horse Stable is 13 by 30 feet, and contains five single stalls, each four

and a half feet wide, and one double stall seven feet wide, for a team to feed when in harness, and readily accessible through the wide stable door. One or two small trap doors allow the attendant to cast the cleanings through to the manure shed below; and a cast-iron drainage plate, slightly concave, set with holes, (Fig. 13,) allows all the liquid to fall on the manure heap, which, if necessary, should have an amount of absorbents, such as straw, sawdust, or coal ashes, sufficient to prevent waste. This stable is well lighted with three small glass windows.



Next adjoining the stable is a room, 10 by 13, for holding all coarse tools or implements connected with the farm; and next to this is a smaller room for the smaller tools, such as are represented in Fig. 7, which need occupy but one side, while the other side may have a work bench and vice.

The *Granary* is 12 by 13 feet, and contains five bins, which will hold over 600 bushels. The rear and larger bin may contain mixed grain for cattle and horse feed, and be discharged through a tube into a wagon below. The smaller ones may have the bottoms raised eight inches above the floor, with an opening and slide in front of each, and a recess beneath, so that a half bushel may be placed under the opening, and filled in a moment with little labor. The granary being on the corner of the barn, with the barn floor on one side and the tool room on another, is less liable to be entered by rats, than if surrounded by concealed passages.

All the space over the granary, tool rooms, and horse stables, may be filled with unthrashed grain, besides the poles or platforms extending across the ends of the space over the floor.

A slate and pencil should always hang in the granary, to keep reckonings, register orders, &c.

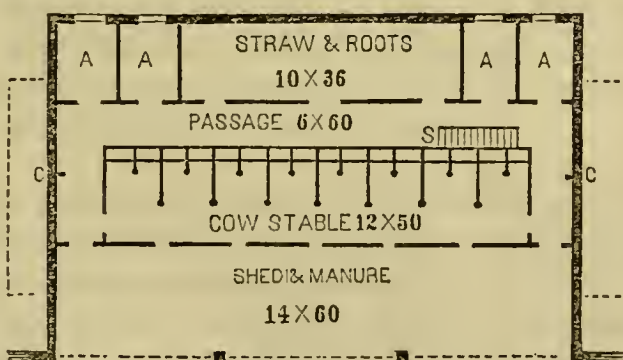


Fig. 14—BASEMENT.

A. A. A. A. Boxes or pens for calves and cows with calf, 6 by 10 feet each.

C. C. Cisterns under the wagon-way or abutments, from which water for cattle may be drawn through a cock.

The plan of the basement nearly explains itself. The mode of filling the root room has been already described. There are a number of sliding board windows in the rear of the cow stalls, for throwing out manure, and over a part of them glass windows for admitting light. It will be observed how accessible the roots, straw and hay are in front; and that the manure in the rear is easily drawn off by a cart, without the necessity of resorting to the

wheelbarrow, except it be in cleaning the cow and calf pens.

The thrashing may be done in the most economical manner, according to the directions given in the description of the first design.

There are over 3,000 square feet of surface on the roof, and about 2,000 barrels of water fall annually upon it, in the form of rain, affording five or six barrels daily for watering cattle, if watered by it all the year round. The cisterns should, therefore, hold not less than 500 barrels. (This size will not be needed, if there are other supplies of water—or if the herd is not large enough to consume so much.) If these are each twenty-five feet long and six feet wide, they will hold this amount. They should be well built, of masonry and water-lime, and arched over the top like a stone culvert, so that there will never be danger of the embankment falling in. A good well in the middle of the passage, with a pump, would obviate the necessity of these cisterns.

The cost of this barn, built with rough boards, would be about \$800 or \$900; planed and painted, \$1,100 to \$1,200.

ENLARGEMENT OF THIS PLAN.

It will be observed that by increasing the length of this barn, accommodations may be procured for any additional amount of land. If more room for hay is desired, the bay or a part of it may extend down into the basement; and it may be two feet wider. Or, two rows of cattle stalls may be placed so as to run across the basement, from the root cellar to the front. Or, by building it between two slight elevations of land at the ends, the basement may open on both sides.

All the principal doors should be hung on rollers, and they will never cause annoyance by swinging about in the wind, and require no room for opening and shutting.

STABLE DETAILS.

Details for the construction of stalls are given in the REGISTER for 1860, or in RURAL AFFAIRS, p. 285 of vol. 2. For those who do not desire their cattle to occupy stables all the time, and especially for such as have a well protected shed, the following mode of constructing stalls, copied from the COUNTRY GENTLEMAN, may be valuable. "This plan consists of a series of *open stalls*, as they are called, constructed as shown in the engraving, in two rows, face to face—perhaps ten or twelve stalls, or even more, in each row—with a wide manger or feeding-way between, into which the fodder or meal, or whatever the cattle have, is admitted from above, the ends open by movable boarding, so that it may be swept out if occasion requires. These stalls are too narrow for the animal to lie down in at all, and each goes out and in at pleasure. The floor slopes about two inches from the head backward, and in going out and in, the animal cleans out its own droppings, so that no labor is required in this respect. The triangular space through which they put their heads into the manger, is too small to admit of their getting their feet into it, while, by the projection of the side of the stall 15 or 16 inches into the manger, they are completely prevented from interfering with one another, as regards the head and horns. The cattle are never tied in the stall.

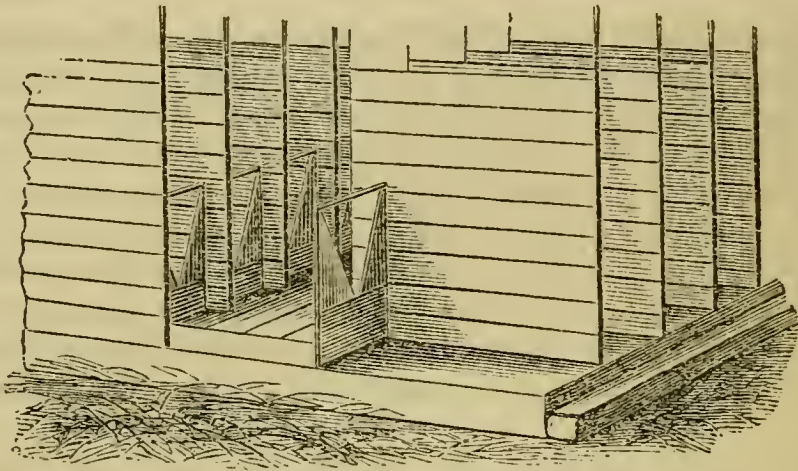


Fig. 15—STALLS FOR COWS, OR STEERS OF MEDIUM SIZE.

DIMENSIONS.—Partitions between stalls—3-inch scantling, boarded on each side—distance apart, 2 feet 10 inches from center to center.

Length of stall, 5 ft. 6 in. to the manger—side of stall projects into manger 1 ft. 4 in.

Manger—6 ft. 6 in. wide from center to center—1 ft. 11 in. high on outside—1 ft. 1 in. high on inside.

Floor—16 to 18 inches high from ground—with step—slopes about 2 inches backward from manger.

In the engraving, the end is taken out of the manger to show the heads of the opposite stalls, and the first stall at the right hand is represented without siding—the triangular space through which the cattle insert their heads into the manger is $4\frac{1}{2}$ inches wide at the bottom, instead of coming quite to a point, as might be inferred from the cut.

DIMENSIONS OF SIMILAR STALLS FOR CALVES.—Width of stalls, 2 feet, center to center—length, 4 feet 4 inches to manger—width of manger, 4 feet from side to side—height of manger outside, 20 inches; inside, 12 inches—sides of stall project 11 inches into manger, to keep each animal's feed separate when so desired.

An aperture in the floor above corresponds in width with the manger, through which hay, &c., is put down for the use of the cattle.

The first objection urged against this system before one sees its operation, is that the cattle in the stalls would be injured by others "hooking" them, and some have said that no printed description of the open stall would convince any man that such would not be the case. The truth is, however, that *the elevation of the stall floor*, 16 to 18 inches above the ground, a stick of timber or other step being provided, as shown in the above cut—prevents this hooking, because the animal outside, to get at the one inside, must put its fore feet upon the step, thus raising the head entirely out of the downward position in which it must always be put for "hooking" purposes.

The advantages of the system, are the material saving of labor effected in feeding and cleaning out, as compared with other stalls; and, as compared with feeding boxes, in the fact that each animal is protected in obtaining all it wants, and "underlings," instead of being forced to eat the scanty leavings of the stronger beasts, have an equal chance at the first and best. Indeed, when the cattle get to running around and annoying one another, the weaker will go into these stalls for protection at once. The system is thought more healthy also, because water troughs are kept close by the stalls, and the animals while at their food are seen to come out at intervals for a drink, and return to the manger; while it is noticed on the old plan of taking them out to water at night and morning, that after a night's abstinence and a dry feed with daylight, they will fill themselves so full of the almost freezing liquid as

to chill the whole system, and perhaps prevent their drinking much when again taken out at a later hour. They would then really have but one long drink during the twenty-four hours, and it is easy to see that this cannot be as natural or healthy as it is to leave them free to quench their thirst before it becomes immoderate, and as often as Nature may dictate. Salt is also kept within their reach, as well as water; the floor is littered whenever necessary, perhaps twice a week; the manure from the horses comes down into the same place, and not a drop or an atom of the whole is lost."

A difference of opinion prevails among good farmers, as to the comparative advantages of stabling cattle and allowing them to run loose under a well protected cover. There is but little utility in a shed, with the wind sweeping freely under the sill, or blowing into its open side from the opposite direction. On the other hand, the benefits of stabling are greatly diminished by foul air and want of general cleanliness. The advocates of sheds have probably derived their dislike to stables by seeing animals breathing fumes from unre-moved manure, or lying on wet and dirty straw. Those who prefer stables may not have given sufficient credit to a spacious, deep, perfectly sheltered shed.

One of the best of these that we have seen, occupied the whole of the barn basement, opening from prevailing winds, and the yard in front was flanked by high fences. More room is thus required for a given number of cattle, and they probably consume rather more food, thus partially exposed, than if entirely shut in; but they did not need the constant attention required to keep stables in a condition of perfect cleanliness. The feeding stalls just described, would be a valuable appendage to such a shed, and by protecting the smaller animals, admit of a larger herd for the same space or accommodations.

DESIGN III.

A LARGE THREE-STORY BARN.

A three-story barn can be erected only on a hill-side. The descent, however, should be very moderate—not to exceed ten feet in forty or fifty. A steeper descent will make a slippery cattle-yard. The natural rise on the higher side of the barn should be about equal to the height of the basement on that side; an embankment of eight or nine feet more, including abutment and bridge, will give easy access to the upper floor.

Barns with three stories are the best for saving labor. The hay is mostly pitched downward. The straw, when thrashed, is thrown downwards through shoots, or down on the tops of stacks, out the back door. Grain from the fanning mill runs down through trap-doors into the granary bins; or is drawn off through tubes, for feeding horses and cattle below.

The barn here represented is 42 feet wide, and 104 feet long. It will hold over 150 tons of hay, or a corresponding proportion of grain; stable eight horses, and nearly forty head of cattle. It will consequently furnish accom-

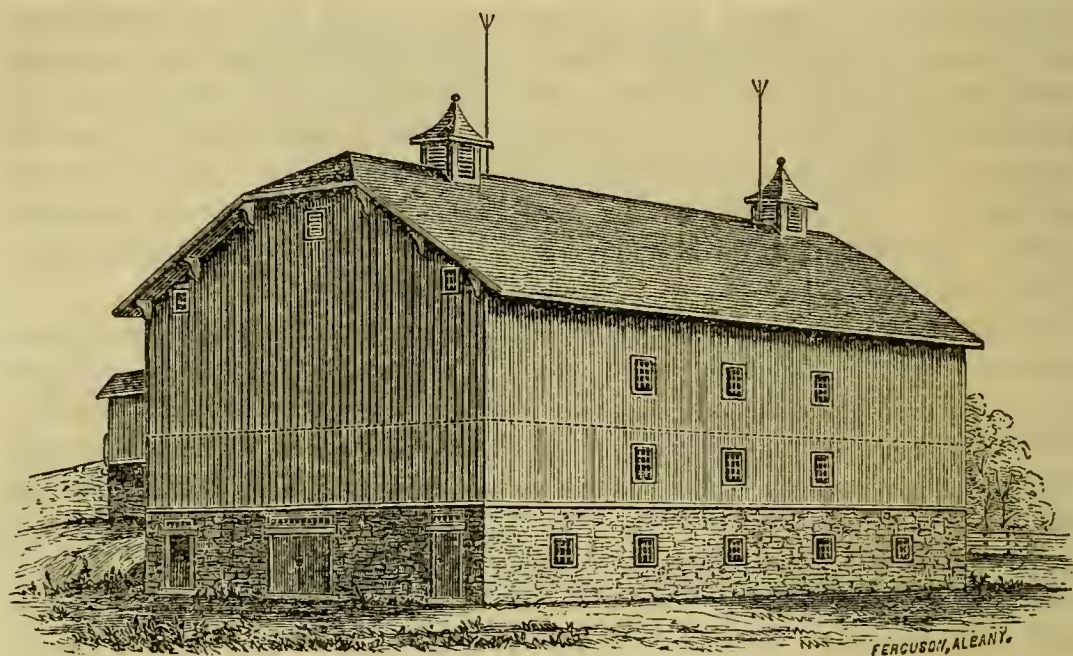


Fig. 16.—LARGE THREE STORY BARN.

modations for a good farm of about 150 arable acres. Some poor and badly cultivated farms of twice this size would not fill it.

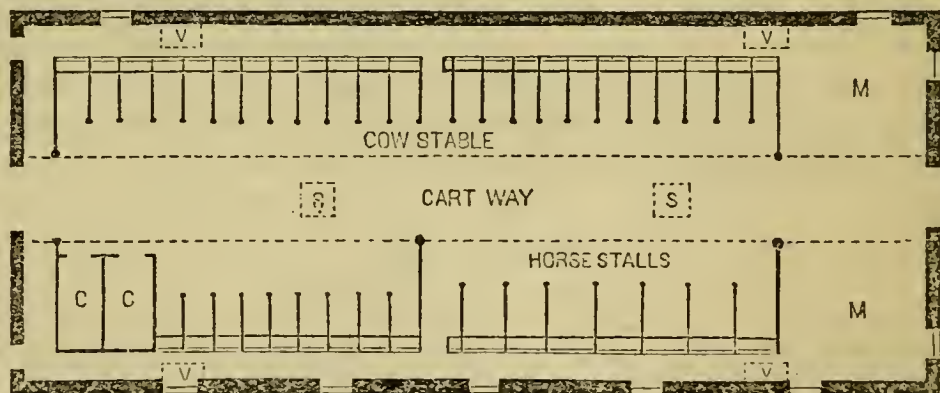


Fig. 17—BASEMENT—FIRST PLAN.

C. C. Calf pens. M. M. Manure heaps. S. S. Places where shoots from above discharge straw for litter. V. V. V. V. Places of ventilators above, through which hay is discharged for feeding.

Two plans are furnished for the basement. The first, fig. 17, is mostly occupied with stalls; eight of which, the driest and most remote from the damp walls, are for horses. To prevent all dampness, they should be well floored, well drained, properly littered, and perfectly ventilated. The rest are cattle stalls. If stanchions are employed to secure the cattle, the whole may be set free, and again fastened, by the single movement of a rod extending the whole length, and attached to each moveable bar. If the cattle always find their feed on returning to the stalls, they will always readily take

their places in order, on admission to the stable. Hay from above is thrown down through the shafts V. V., and straw for litter through S. S. The cart-way extending through the middle, affords easy cleaning of the stables; and the manure thus collected, amounting to two large loads daily, may be drawn directly to the land, or to the compost heap; or it may be deposited in large square heaps at M. M. This barn is supposed to be erected on a farm where roots are not raised; but if room for them is needed, a root cellar may be made at M., reducing, if necessary, the length of the corresponding range of cow-stalls.

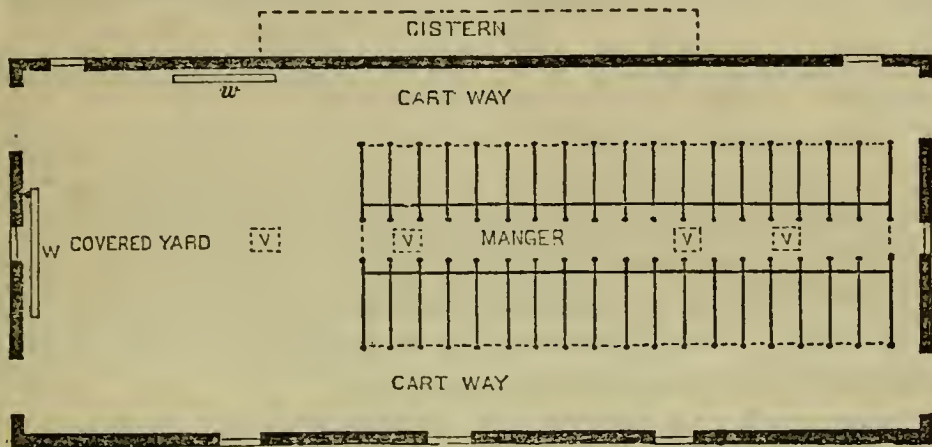


Fig. 18—BASEMENT—SECOND PLAN.

W. Water trough, fed by pump from well. w. is the place for water trough if fed by stop-cock from cistern under bank. V. V. V. V. Places where hay and straw are thrown down from above.

The second plan of the basement is adapted to the kind of feeding stalls shown in fig. 15, on a former page, leaving a covered yard or space for loose cattle 40 feet square, and two passages wide enough for carting away daily the manure. If this plan is adopted, the places for discharging hay from above are changed to suit this plan, as will be soon explained. If a well is used for watering the cattle, the trough may be placed at W. If a cistern, this may be built under the bank, outside the walls, and be made of stone and cement,

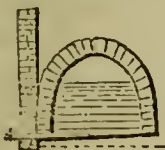


Fig. 19.
SECTION OF
CISTERN.

of an oblong form, arched overhead, like a culvert, so as to be secure from ever breaking it, when trodden upon by horses above. Fig. 19 is a cross section of this cistern, showing the slope of its bottom, for completely drawing off all the water, through the stop-cock or faucet. Such a cistern, fifty feet long and six feet wide, will hold about five hundred barrels of water.

To accommodate sheep, pens, like the calf pens C. C. in the first plan, may be added in the same range; or the covered yard in the second plan may be partly devoted to this purpose.

The floor or story next above the basement, fig. 20, may be about eight or nine feet high. The large carriage room will contain several vehicles, which may be run around the central bay and passed easily out the other door. A

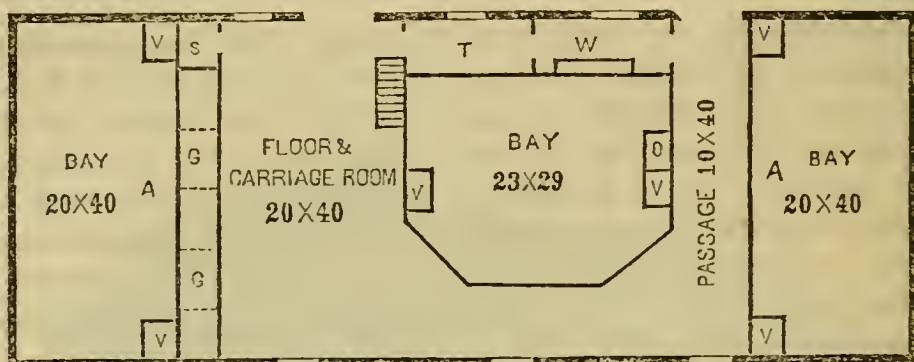


Fig. 20—FLOOR ABOVE BASEMENT.

G. G. Granary. S. Saddle room. T. Coarse tools. W. Workshop and bench. V. V. V. Ventilators and hay dischargers. A. A. Place for ventilators when Second Plan of Basement is adopted. O. Bin or reservoir of oats, for horses below.

load of grain from the granary, G., may be readily loaded and drawn out by entering at the last named door. The bottom of the bins of the granary, (which are about five feet wide,) should be nearly a foot high in front, so as to admit a half bushel under the spout, and they should be two and a half feet higher at the back, by which all the grain may be drawn off by merely raising the slide. As they extend up to the upper story, and are filled from above, this space beneath them is not needed.

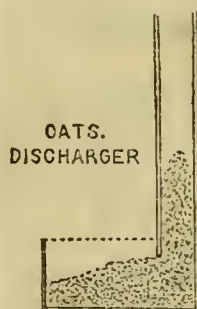


Fig. 21.

O. is a bin for oats, directly over the horse stable, filled through the trap door above, and communicating with the stable by the self-feeding discharger, fig. 21, which may have a cover and be locked. The bottom of the oats bin should be hopper shaped, that all may be drawn off. If the bottom has a slope of one foot in two, the grain will all slide out freely.

It will be found usually most convenient to fill the lower parts of all the bays with hay, and then the grain above. This will render the grain accessible to the upper or thrashing floor.

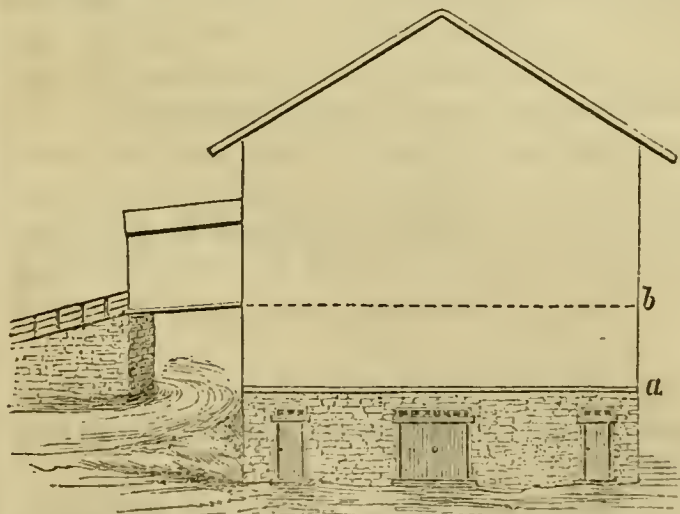


Fig. 22—END VIEW OF LARGE THREE-STORY BARN.
a. Granary floor. b. Thrashing floor.

But if much hay cannot be cut so early, the bays should be at least filled as high as the thrashing floors, before unthrashed grain is deposited. The central bay may be used for storing straw, if the first plan of the basement is adopted, and it is readily discharged at the points S. S., fig. 17. (For one or two story barns, sixteen feet is as great a width for bays as is entirely convenient for filling; but as a large por-

tion of the hay is thrown downward, in one of three stories, the bays may be eighteen or even twenty feet wide.)

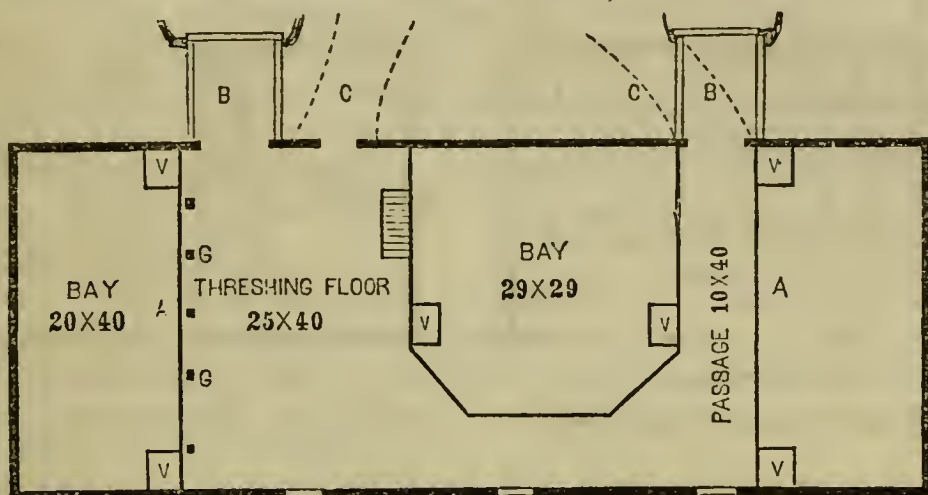


Fig. 23—UPPER FLOOR.

G. G. Trap doors to granary. V. V. V. V. Ventilators. A. A. Place for ventilators for Second Plan of Basement. B. B. Bridges from abutments to upper floor. C. Carriage way between abutments, to floor below.

The upper floor, fig. 23, reached through the covered bridges, shown in the section, fig. 22, receives every load of hay and grain, for deposit in the bays, and when the wagons are unloaded they are driven around and out at the other door. Two may be unloading at once, there being ample room for them to meet on the thrashing-floor.

It is intended to use a two-horse endless chain horse power, to do the thrashing, as this mode enables the farmer to do the work without any additional help, and especially during the comparatively leisure season of winter, and to keep a constant supply of fresh straw, where this is fed to animals.

The basement should be about nine feet high, the next story eight feet or more, and the upper may have sixteen feet posts additional.

The cost of this barn, well built and covered with rough boards, varying with localities and other circumstances, will be about \$1,600. If planed and painted, it will exceed \$2,000.

DESIGN IV.

A SMALL THREE-STORY BARN.

This is about one-third the capacity of the barn last described, being 34 by 56 feet. The basement, fig. 24, resembles in its general design, that of Design II., but being eight feet narrower, the calf-pen range is contracted to six feet wide, the feeding passage to four feet, and the shed to twelve feet. No further description of the basement will be necessary.

The next story above, fig. 25, is occupied with the bays at each end; the row of bins for grain, discharging by slides, as in the previous plan, a foot above the floor; a shoot, *v.*, for receiving straw for litter, and for covering

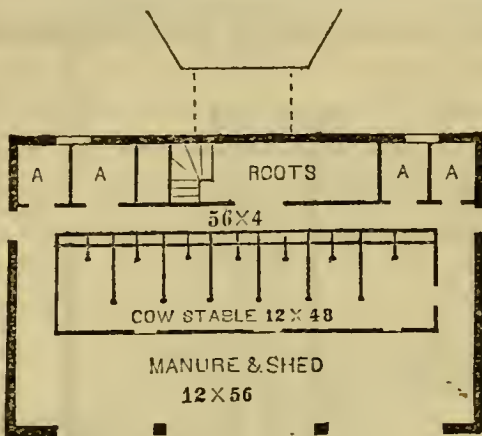


Fig. 24—BASEMENT.

A. A. Calf pens, 6 feet square.

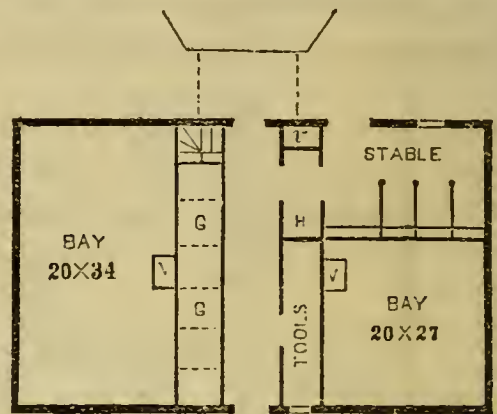


Fig. 25—MIDDLE FLOOR.

G. Granary. V. V. Ventilators and hay shoots. v. Shoot for straw.

the roots below as a protection from frost; harness, saddle, and buffalo room, H.; a tool room, arranged as shown in figs. 7 and 8; and a stable for horses, one of the stalls being $6\frac{1}{2}$ feet wide, for driving in a team in harness. The other stalls are $4\frac{1}{2}$ feet wide.

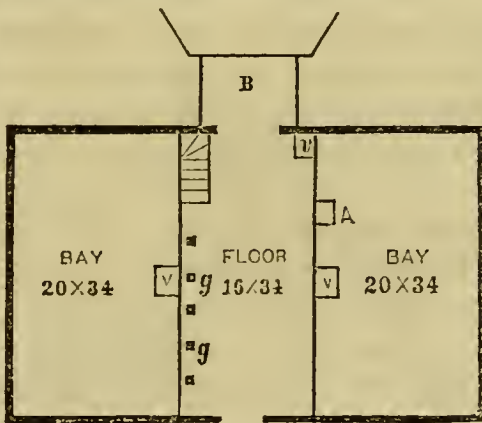


Fig. 26—UPPER STORY.

V. V. Ventilators and hay shoots. v. Shoot for straw. A. Shoot for hay to horse stable. B. Bridge from abutment to thrashing floor. g. g. Trap doors to granary.

The upper story, fig. 26, has a continuation of the bays; a thrashing floor, with trap doors at one side for filling the granaries below; the shoot, v., for throwing down straw from the thrashing floor; and the one A. to supply the horse stable with hay. A door placed next the stable, in the shoot, v., on a level with the horse stable, turns on hinges placed on its lower side, so that it may open inward, and in doing so, close up the shoot, that straw thrown down now will fall into the stable.

This door, when allowed to fall open, rests in a sloping position, as shown by fig. 27, representing the door open, and fig. 28, the same as closed, and leaving a free passage for the straw to the basement.

This barn will hold over sixty tons of hay or unthrashed grain, stable five horses, eighteen cows, and store five or six hundred bushels of grain. It is a very complete barn for its size, and furnishes a great amount of accommodation for its cost, which is about \$700 or \$800, built rough, or \$1,000 planed and painted.

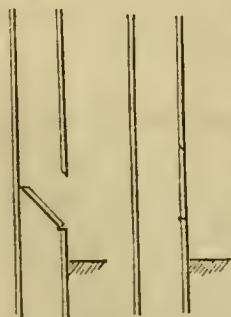


Fig. 27. Fig. 28.

As already suggested, a corn house should be separate from the barn, where any considerable quantity of corn is raised, that it may be freely ventilated

on every side. The reader is referred to a good design for such a building, on page 98 of second volume of *RURAL AFFAIRS*, altering it so as to omit most of the bins, and substituting their places with corn-crib room. Bins for other grain than shelled corn are more convenient in the barn where such grain is thrashed. The size of the building referred to may be therefore considerably reduced. The posts should raise it just sufficiently to drive a load of corn under, so that it may be thrown up through a low door at each end, by means of a scoop shovel, into the central passage, for sorting. These doors should hook inside.

A better mode of filling in some cases may be the following, in wet seasons. Place the corn-crib, when circumstances will allow, within twenty feet of a three-story barn. Draw in the corn as husked, dump it on the floor, assort it, and pass it down a sloping shoot, or ladder supporting a trough, into the corn-crib.

A well arranged piggery, which may also be a separate building, is figured and described on page 33 of the same volume of *RURAL AFFAIRS*.

VARIOUS DETAILS.

Drains for liquid manure, in basements, should be made of flagging or hard burned brick, and be wide enough on the flat bottom to admit a square shovel, for readily cleaning out manure that may have fallen in. There should be a slope from one end to the other, that the liquid portions may drain off, and this slope must be provided for when the barn is laid out. The liquid may run into a tank; but it will usually be most convenient to pump it from the tank frequently, on the manure heap. Where large quantities of litter can be always used, this will absorb most of the liquid portions, and obviate drains.

A *small side-door*, for entering the barn without the necessity of opening the large doors for simply passing in and out, will be a convenience.

The *basement walls* should be laid in a broad, deep trench, filled with stone, to effect thorough drainage.

In *laying floors with a lining*, a mixture of gas tar and air-slacked lime, or tar and fine sand, spread between the boards, will make them perfectly tight, and promote durability—or tar and lime in the cracks only, will be very useful.



Fig. 29.

In *laying matched floors*, the ends of plank may be prevented from rising, by matching as shown in the cut, (fig. 29,) which is quickly done with a saw.



Fig. 30.

For *splicing timbers and scantling*, the mode shown by fig. 30 is an easy and good one, the parts being firmly spiked together.

Eave troughs should always

be constructed, either for supplying cisterns or for conveying the water away from the foundations, manure heaps, and cattle. The common tin scuppers are cheap and good.

Siding. The most commonly approved covering is vertical boarding and battens. Some good builders, however, prefer *double boarding*—the inner boards, round edged, being half an inch thick, and secured in their places by shingle nails, and the outside, three-fourths thick, put on at the same time, to break joints properly, and all well secured by twelve-penny nails.

A broad projecting roof adds much to the durability of the upper walls.



FERGUSON, ALBANY.

FORMS OF VEGETABLE GROWTH.

VEGETABLE PHYSIOLOGY:

OR, HOW PLANTS GROW.

A large share of the business of the farmer, gardener, and fruit culturist, is in connection with the growth of plants and trees; and it therefore becomes important that he should so understand the process as to know what will influence vegetation, or hasten it on one hand, and retard it on the other.

The formation of a giant tree from a minute seed, is one of the most interesting and wonderful occurrences in nature. But as vegetable growth is daily witnessed by every one, nothing is commonly thought of it; and many persons, if asked "How do plants grow?" may answer, "Why, it is *natural* that they should—that is the way they all do, unless they happen to be destroyed." This, however, is not an explanation of the process. Let us

therefore, take a brief glance at the successive stages of a plant or tree, and explain how it first springs from the minute embryo in the seed, and expands into leaves, branches and roots, gradually increasing in size until it reaches full maturity.

The whole process may be better understood by going back beyond the seed, and viewing the first formation of the embryo. If the flower of a plant is examined by means of a powerful microscope, the germ or central portion will be found to contain at first a little *vesicle* or bladder-like body, often so small that a hundred could lie upon the point of a pin. This is the very beginning of the plant—the earliest stage of its embryo existence. But it will never become any thing more than a grain of soft pulp, unless it is fertilized or acted upon by the pollen or dust from the anthers of the flowers. When thus fertilized, the little globule begins to expand, and soon assumes a distinct form.

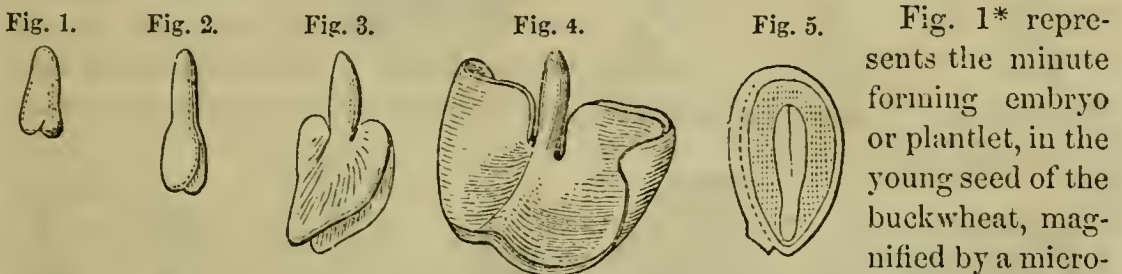
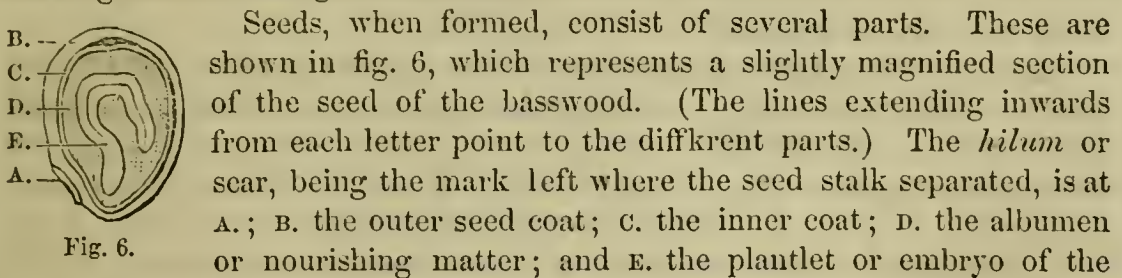


Fig. 1* represents the minute forming embryo or plantlet, in the young seed of the buckwheat, magnified by a microscope—the nick at the end shows the commencement of the little seed leaves; fig. 2 exhibits the same more advanced; fig. 3 shows the seed leaves distinctly formed; and fig. 4 the same as found in the full grown seed or grain. These seed leaves, as afterwards expanded in the growing plant, are familiar to every farmer, being the two first kidney-shaped leaves which appear above the soil in every young crop of buckwheat. The manner in which they are folded in the seed, is shown in fig. 5, which represents a moderately magnified grain cut through the middle.

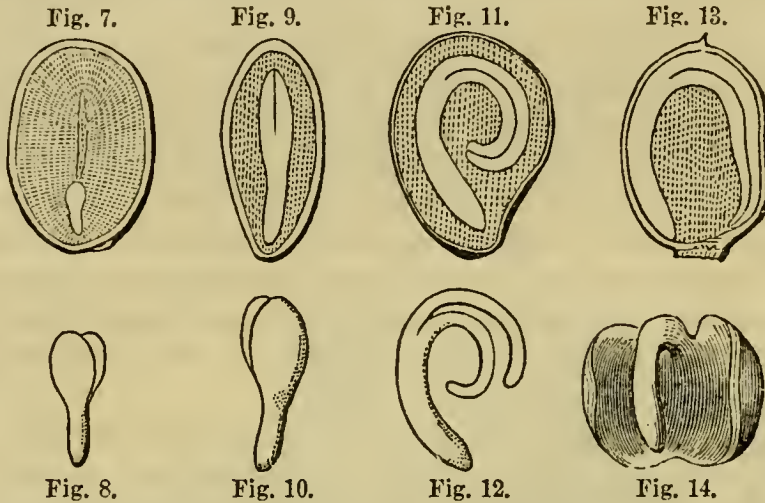


Seeds, when formed, consist of several parts. These are shown in fig. 6, which represents a slightly magnified section of the seed of the basswood. (The lines extending inwards from each letter point to the different parts.) The *hilum* or scar, being the mark left where the seed stalk separated, is at A.; B. the outer seed coat; C. the inner coat; D. the albumen or nourishing matter; and E. the plantlet or embryo of the young plant or tree.

The albumen is the nourishing matter, commonly surrounding the embryo, or in contact with it, destined to nourish the young plant when it begins to grow. It is the floury part of wheat, corn, and buckwheat, where it not only supplies nourishment to the young plant, when sown as seed, but to men and

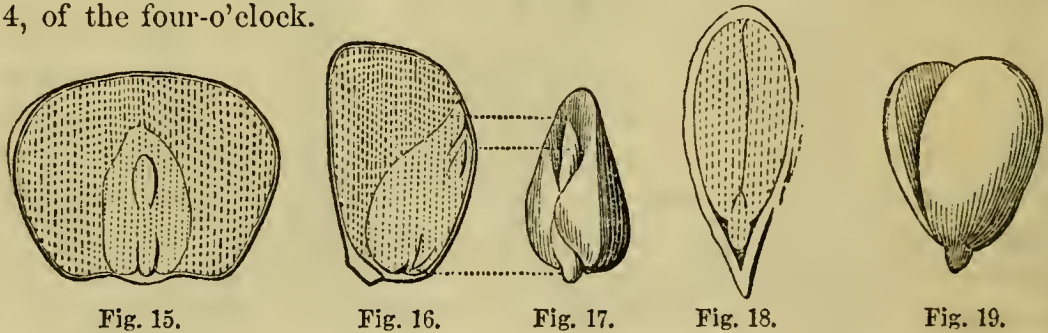
* For most of the cuts illustrating this article, we are indebted to Prof. GRAY'S admirable Introduction to Botany, and to the liberality of the publishers, IVISON & PHINNEY, of New-York.

animals, when ground into meal or flour. It is not always *mealy*. In poppy seeds it is oily; in the peony and barberry, it is fleshy; in coffee, it is horny. But it always becomes softened when the seeds begin to grow. The quantity varies in different



seeds. Fig. 7, for example, is the section of a seed of the peony, filled with albumen and with a very small embryo near one end—fig. 8 is the embryo, separate, and magnified. Fig. 9 is a section of a barberry seed, and fig. 10 the detached embryo.

Figs. 11 and 12 show the seed and embryo of a potato seed; and figs. 13 and 14, of the four-o'clock.



Figs. 15, 16 and 17, are slightly magnified views of a cut grain of Indian corn, the first cut the longest way, showing the embryo, lying against the albumen, which constitutes most of the grain; the next, cut across; and the third, the embryo detached.

There are many kinds of seed that have no separate deposits of albumen for nourishing the young germinating plant, but this nourishment is afforded by the thick seed-leaves of the embryo itself, as in the maple, the apple, the bean, and pumpkin. Fig. 18 shows an apple seed cut through the middle lengthwise, showing the small embryo, with its larger seed leaves above. Fig. 19 shows the embryo and seed leaves taken out. In the peach, almond, chestnut, and horse-chestnut, these seed leaves are still larger and more fleshy and supply much food to the young plant.

The word *kernel* is usually applied to the whole of the seed within the coats, whether it is all embryo, or a large part albumen.

GERMINATION.

The first movement of the seed towards forming a new plant is termed *germination*. After the plant is formed, and its growth is carried on through

the agency of its leaves, the process is termed *vegetation*; the latter immediately following the former.

To produce germination, seeds require heat, moisture and air, but not light. It will be observed that these three requisites are present when seeds are slightly buried in moist, warm, mellow earth. Heat, although essential to all seeds, varies in the required degree, with different species. The chickweed, for instance, will vegetate nearly down to the freezing point; while tropical or hot-house plants often need a blood heat. Nearly every person has seen frequent proofs of the necessity of moisture to cause seeds to germinate—indicated by the practice of watering newly sown beds. The farmer knows that wheat sown in a very dry soil may not come up. The florist is aware that minute seed, which cannot be planted deep, as the portulacca, must be kept moist by a thin covering or shading. It is often requisite to bury seeds to a considerable depth, in order to secure a proper degree of moisture to start them. It is not unusual to see uncovered grains of wheat or corn sprouting and growing in long continued rains, which also sometimes ruin crops of wheat left exposed in the sheaf, or even in the field uncut.

The third requisite, *air*, is an important one. Seeds may be kept dormant a long time by deep burying. Nurserymen have often retained the vitality of peach stones for a year or two, by burying them a foot or more in compact earth. Other seed might doubtless be kept for a time in the same way. Planting too deep is often fatal to the success of a crop. The seeds of noxious weeds remain many years buried beneath the soil, until cultivation brings them up, mixes them with the soft mellow surface, accessible to air, when they spring up in profusion over the ground. Many of the seed are quite minute, and not occupying a ten-thousandth part of the soil in which they lie, their presence cannot be detected. Hence some persons, ignorant of the laws of vegetable growth, erroneously suppose that weeds spring up spontaneously, or without seed, a thing which has probably not occurred since the creation of vegetable growth. For example, of the seed of the chess plant, about two million are required for half a cubic foot; yet a single grain to each square foot of soil would produce a heavy crop, if all the wheat with which it is sown were killed, so as to give room for it to grow. Hence, only a two-millionth part of the bulk of the soil in chess seed, may produce a crop. Other seed are much smaller, and the disparity more striking.

In order to produce germination, moisture must find ready access to the the interior of the seed. It is often excluded with some seeds, if the coats have been allowed to become too dry. The thick coverings of the chestnut, horse-chestnut, and many seeds of similar character, if left a few days exposed to the air, become so hard as to prevent it. To secure success, they must be kept moist by imbedding them in moist sand, leaf mold, or moss, from the moment they separate from the tree, until planted in the earth. Apple and some other seeds, which have been allowed to become too dry, may frequently be started by scalding and then exposing to the action of the frost, and by

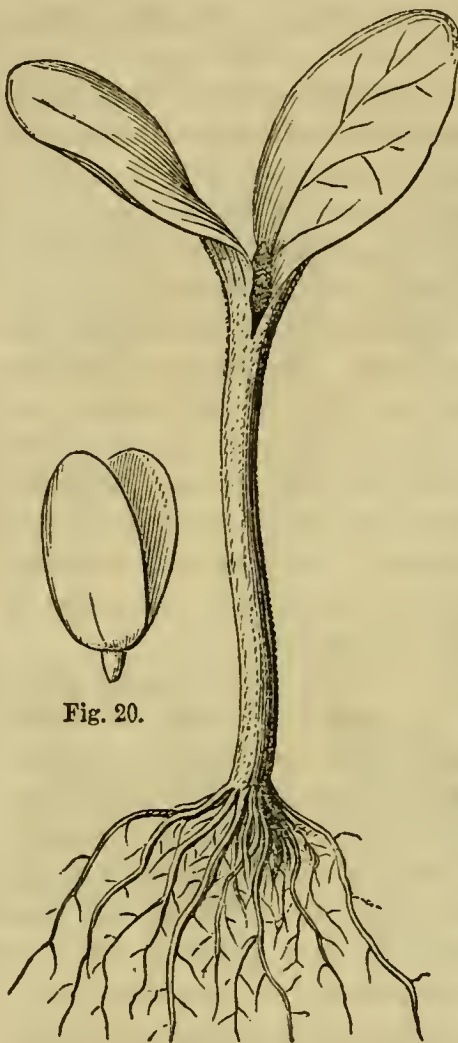


Fig. 20.

Fig. 21.

repeating the process several times, there is greater certainty of germinating. As the scalding and cooling must be quickly done, portions not larger than two or three pounds should be taken at a time. The object in cracking peach and plum stones before planting, is to admit air and moisture—a process which is also hastened by subjecting to freezing and thawing.

Process of Germinating. Moisture and heat produce chemical changes in the fleshy part of the seed. The embryo immediately begins to expand. The result may be seen in various examples, one of which is represented in the annexed figure, (fig. 20), which represents the embryo of the pumpkin, taken from the seed, by simply removing the coats. The little projection at the lower end is the part that afterwards becomes the stem, and is commonly called the *radicle*, because it was formerly supposed to be the little root. It would be more correct to call it the *stemlet*, because the new roots shoot out from its lower end, and the seed-leaves or *cotyledons* expand with green leaves above, as soon as the stemlet has become long enough to thrust the seed-leaves out of the ground, as is shown in fig. 21, which is the young

pumpkin plant as soon as it has come up. It will be seen that the stemlet of the seed has here become more than twenty times its original length; and if the seed are planted very deep it will stretch itself up much longer, in its effort to thrust the cotyledons up to the light. The young seed-leaves furnish nourishment to the new plant, until perfect leaves are formed from the bud between. The bean is more fleshy than the pumpkin, and its cotyledons do not become leaves, but only supply nourishment until leaves are formed. It will be now seen why destroying the cotyledons before new leaves are formed, (as by insects,) destroys the plant itself, by cutting off its supply of nourishment. Fig. 22 is the embryo of the bean; fig. 23 is the young plant as soon as up; and fig. 24 the same more advanced. The apple, pear, cherry, and many other trees, push their seed leaves to the surface of the ground; but in the pea, the oak, the peach, and others, they remain beneath the soil, and simply supply nourishment to the young plant, without performing at all the office of leaves, as is done in the pumpkin, maple, &c. Figs. 25 and 26, show the germination of the pea; figs. 27 and 28, that of the oak. In these

instances, the cotyledons are so fleshy as to afford all the needed food for growth, without assuming the office which leaves usually perform.

One-Cotyledoned Plants. In the cases already given, the seed have two cotyledons or seed-leaves. By far the larger portion of all plants, and all trees with scarcely an exception, growing in the Northern States, are two-cotyledoned. There are, however, many herbaceous plants, and among them wheat, corn, oats,

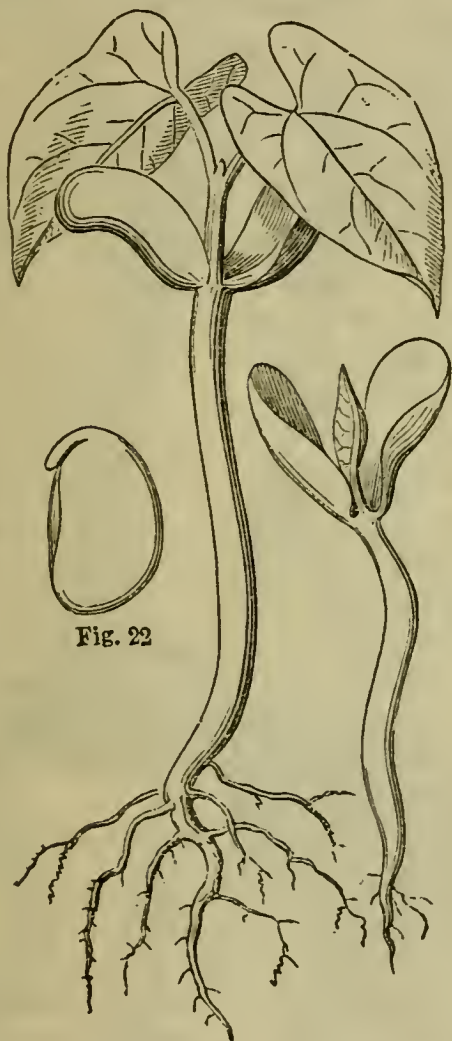


Fig. 22

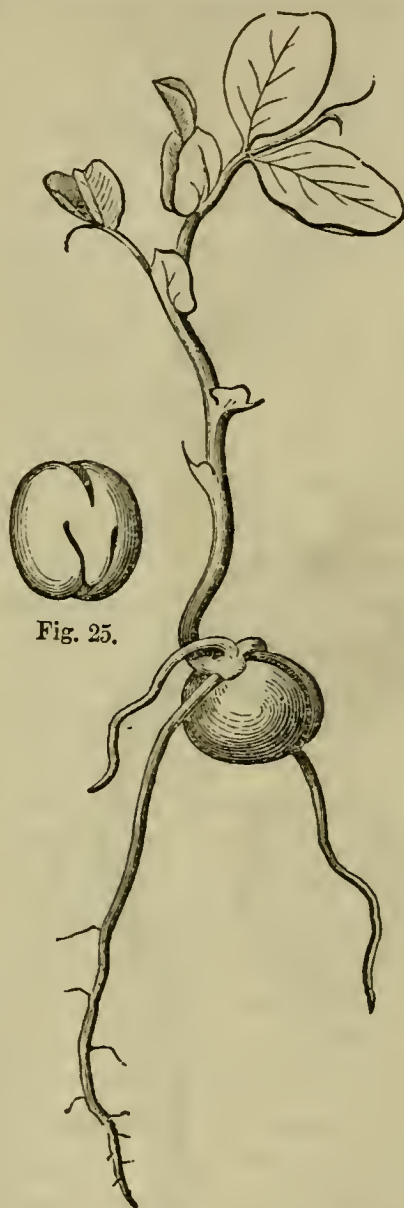


Fig. 25.

Fig. 24.

Fig. 23.

Fig. 26.

barley, broom-corn, and all the grasses, which are one-cotyledoned. These two great divisions are readily distinguished from each other by a single glance at the leaves. If the veins of the leaves ramify or branch into many smaller veins, like net-work, as shown in the annexed representation of a quince leaf, (fig. 29,) they nearly always belong to the two-cotyledoned class of plants. If, on the other hand, these do not branch, but are parallel-veined, or *nerved*, as in the lily, (fig. 30,) they commonly belong to the one-cotyledoned class. Every observing person has seen that the leaves of the

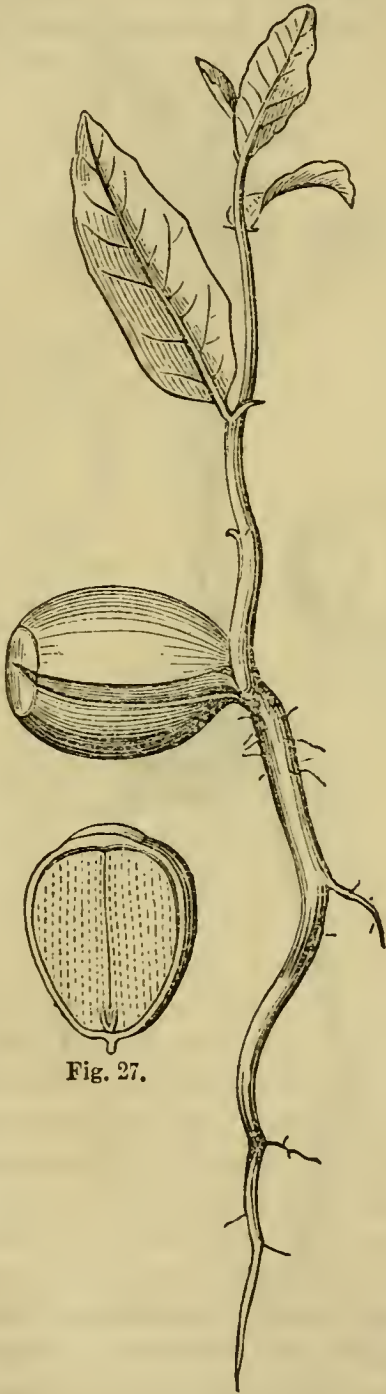


Fig. 27.

Fig. 28.

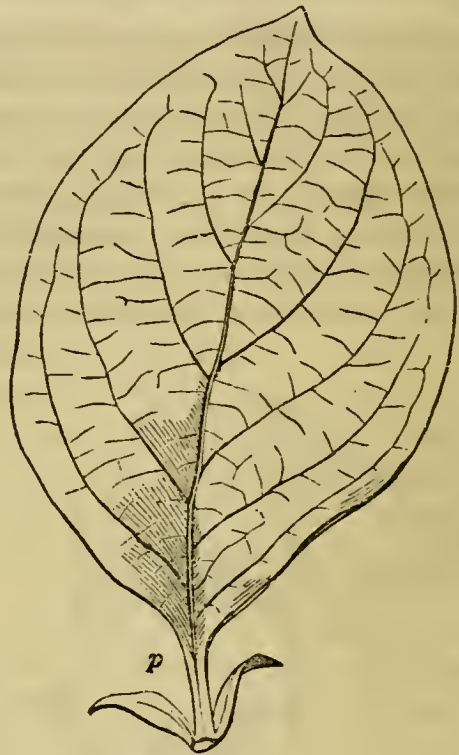


Fig. 29.

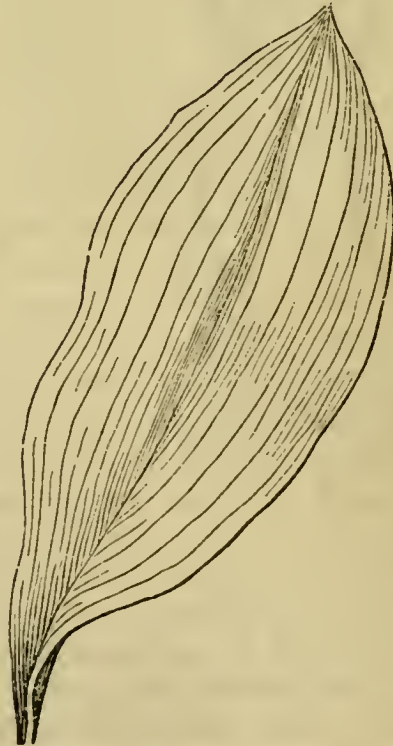


Fig. 30.



Fig. 31.

Indian corn, flag, grass, lily, &c., have only parallel veins or nerves; while those of the maple, beach, cherry, melon, buckwheat, pig-weed, thistle, and many others, have finely branching veins.

There is another striking distinction between these two classes of plants.

Two-cotyledoned trees grow by successive annual layers formed on the outside, which are the successive rings or circles by which the age of the tree is known when cut across. But one-cotyledoned trees grow from the inside and expand outwards, as in the palm and cocoa-nut tree. In the latter there is no distinct and separate bark; in the former the bark is distinct, and generally separates easily. In the corn-stalk, for example, no bark is found; in the hemp, flax, &c., it is easily removed, and becomes an important substance. The first are called endogenous, or inside growers; and the latter exogenous or outside growers.



Fig. 32.

Figs. 16, 17 and 18, on page 146, in this article, show the single cotyledon of the grain of corn, containing inside the bud of a new leaf. Fig. 31 shows the grain of corn after germination has commenced, and fig. 32 exhibits the same more advanced.

As soon as the growth of the seed commences, the stem tends to push upwards to the light, and the root thrusts itself downwards into the darker parts of the earth; they immediately extend away from each other in opposite directions. If the seed at this time be turned over, so as to reverse their position, they will immediately bend, and each assume its proper direction, no matter how many times this adverse process or turning is repeated. The stem, growing upward, sends out numerous branches from its buds. The root, running downwards, branches more irregularly below, and without any buds. The growth of the plant or tree having now fairly commenced, it may be well to describe briefly how the process is carried on, before pointing out minutely the structure of each organ or part.

Mode of Growth. The sap enters the plant by the small thread-like fibres of the roots, and passes from these into the larger roots, and into the stem. From the stem it is

sent into all the branches, and to the extremities of the smallest shoots. Passing through the leaf-stalks, it is spread out by minute veins all over the leaves, where it is exposed to light and air. Much of the water of the sap is here evaporated, at the same time that it receives carbonic acid from the air, and a new and thickened substance is formed, which now gradually descends, not through the sap wood by which it came up, but through the inner bark; and as it descends it deposits a coating of the new soft wood on the outside of

last years' wood, thus forming a new growth. This is the ordinary mode in which all exogenous or two-cotyledoned plants grow and increase in size. With this brief explanation, it may now be proper to describe more minutely,

The Structure of the Plant or Tree. All plants, in the first place, are manufactured or built up of innumerable little cells, sacs, or cavities. These are usually not over a five-hundredth part of an inch in diameter, and in many plants they are still smaller. The original ovule is a single cell; when impregnated by the pollen, it immediately begins to increase by the addition of new cells, which it appears to have the power to form; and thus by successive additions, like the building of a house of bricks, it becomes a large growing plant or tree. Fig. 33 represents a greatly magnified single cell; fig. 34, a large number together, as they usually exist in the plant. In the woody part of a tree, these cells become thickened and hardened, and drawn out as seen in fig. 35, which shows the magnified wood of the buttonwood. They are often irregularly placed together, and small *ducts* or air tubes are interposed between them. Fig. 36 exhibits a small part of the young shoot of the peach, cut across—the whole shoot pre-

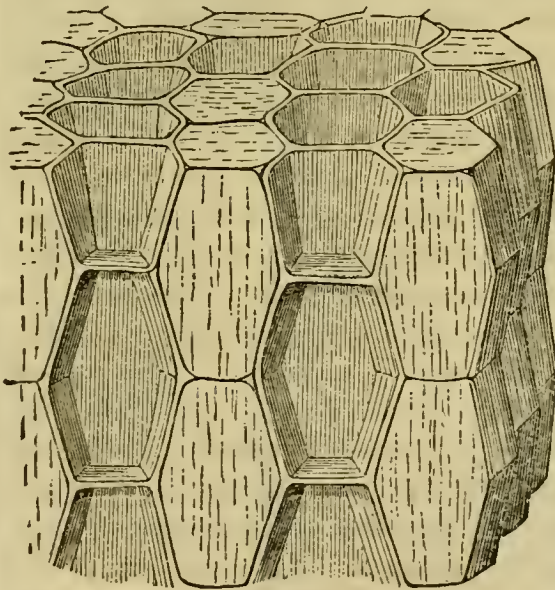


Fig. 34.

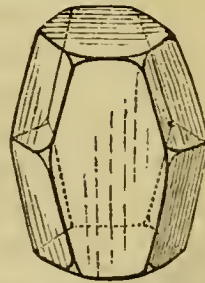


Fig. 33.



Fig. 36.

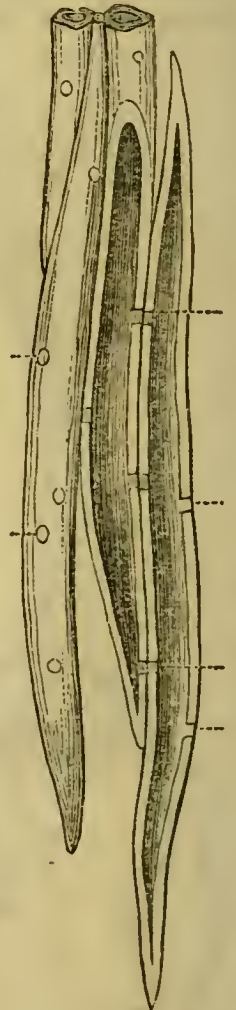


Fig. 35.

senting at least 10,000 of these little vessels, only visible under a good microscope. The branch of an apple tree, an inch in diameter, shows about one million. This cellular structure exists throughout the roots, stems, shoots, leaves, flowers, and fruit.

The cells of plants usually vary from 1-300th to 1-500th of an inch in diameter, and it is obvious that during vigorous growth the plant must form them with great rapidity. A shoot of asparagus increases the length of one cell every ten seconds, and as its diameter embraces many thousands, from fifty to a hundred million are formed every day. The building up of the

plant of these cells has been compared to the erection of a house by the successive addition of bricks; but if as many bricks were daily added to a structure, they would be enough to make a building daily larger than the great pyramid of Egypt, or the Colliseum at Rome. Yet every one of these cells is as perfect and finished as the finest work of art.

THE ROOT.

The root consists of several parts. The *main* root, also called the *tap* root, is the large central portion, extending directly downwards; the *lateral* roots are subdivisions or branches of the main root; the *fibres* are the small thread-like roots proceeding from the laterals; and the *spongioles* or *spongelets*, are the porous and spongy extremities of the fibres, when they are extending in length, and through which they receive much of the sap from the soil. Fig. 37 is a greatly magnified section of a spongelet.

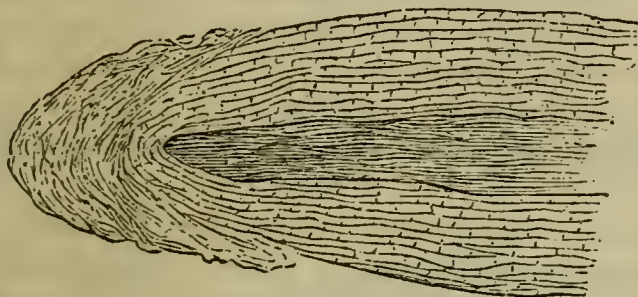


Fig. 37.

The *collar* is the point of union between the root and the stem, but its place may be easily changed in many young plants by banking up the stem, which will emit new roots above. Or, a branch may be buried, as in the formation of a new plant by layering, as in the case of grapevines, honeysuckles, gooseberries, and many other woody plants. Small portions of roots attached to a graft will often produce a new plant; this is especially the case with the grape and rose, which are now extensively propagated in this way; and also in some degree with the apple, which, however, when thus root-

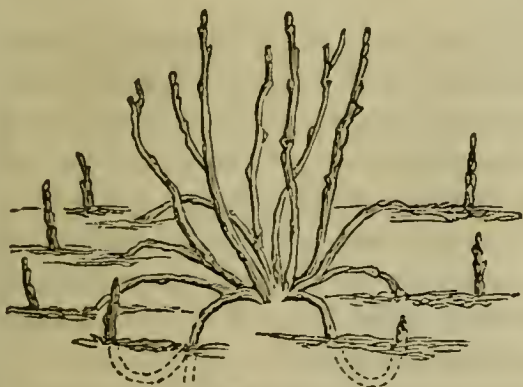


Fig. 38.



Fig. 39.

grafted, larger portions should be employed of the roots of one-year, or at most two-year seedlings. Nearly all trees and shrubs will produce new plants by layers, if young shoots are selected that have soft green bark, through which the new roots are easily emitted, fig. 38. When the roots do not readily strike through the bark, the process may be hastened by splitting, as in fig. 39.

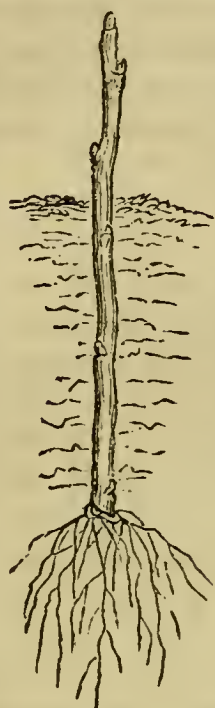


Fig. 40.

Some plants strike roots readily in open air from *cuttings*, partly buried in soil. This is especially the case with the grape, currant, gooseberry, quince, and running roses, fig. 40. They are usually taken from the parent plant after it has ceased growing, and they should be compactly imbedded in the soil with a small portion of the upper extremity uncovered. When long, like the grape, they should be placed sloping, so as not to be buried too deep or beyond the influence of the sun's warmth; at the same time the moisture of the soil is often beneficially preserved by a thin surface coating of fine manure. There are many other plants easily propagated by cuttings, if the two great requisites of vegetation, namely, moisture and warmth, are increased by artificial means, as in a hot-bed under glass; or in a propagating-house, under sash, or bell glasses, with fire heat gently applied beneath.

Roots which throw up suckers readily, may be rapidly increased by planting small cuttings or pieces of the roots, in a warm, moist soil, especially if artificial heat and covering be given. Nurserymen have increased raspberries and blackberries in this way in great numbers.

Transplanting. Very few fruit or ornamental trees ever remain where they first came up from seed, but nearly all are removed one or more times, to the spot where they are finally to remain. For this reason, transplanting becomes a most important operation. If a tree could be removed with all its roots, including the numerous thread-like radicles, and all the spongelets, and placed compactly in the soil, precisely as it stood before, it would suffer no check in growth. The nearer we can approach this condition, therefore, the greater will be our success.

As a general rule, roots extend as far on each side of the tree as the height of the tree itself, or nearly so. If, for instance, a tree be five feet high, the roots will be found to extend five feet on each side, or to form a circle ten feet in diameter. Great care would be required, however, to detect the minute fibres so far. This rule will not apply to slender trees, which have become tall by close planting, but to those that are healthy and well-developed. The great length of the roots is often shown by trees which send up many suckers, as the silver poplar and locust, which may be seen to extend over a circle much greater than the height of the tree.

Many persons "wonder" why trees are so much checked in growth by transplanting, or why they so often die from the operation. They would not be surprised, if they saw all the usual destruction of roots in taking them up. Fig. 41 represents a nursery tree with its roots entire; the dotted lines show where the spade is commonly set for the purpose of lifting; fig. 42 is the tree after taken up, when more than nine-tenths of the roots are cut off—

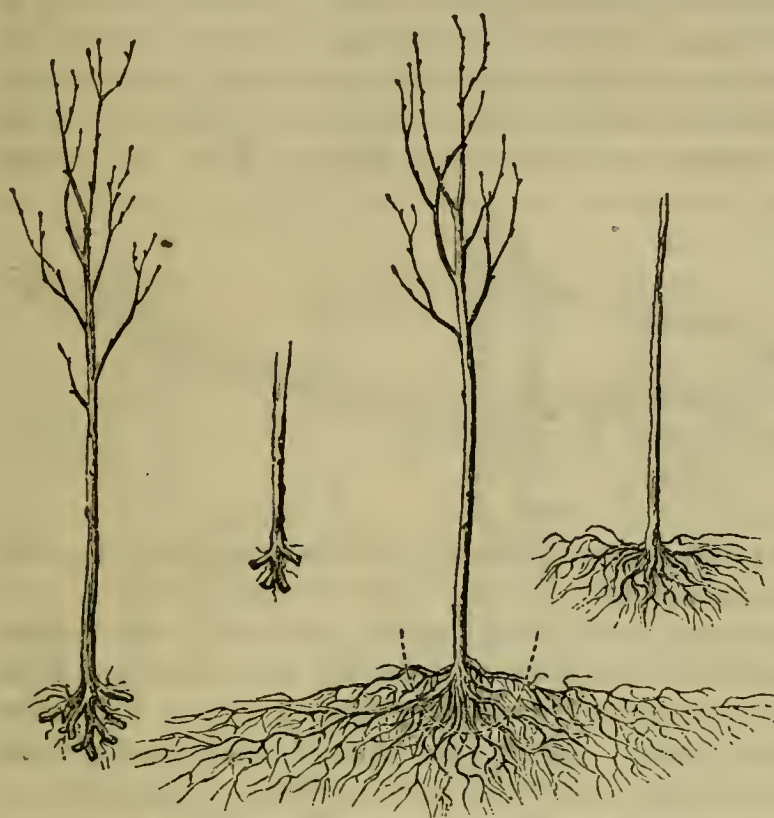


Fig. 42.

Fig. 43.

Fig. 41.

Fig. 44.

On page 180 of the 2d volume of "RURAL AFFAIRS," the necessity of cultivating the whole surface of orchards and fruit gardens is distinctly shown—the roots rapidly extending through the soil and meeting, so that in a few years a young and well cultivated orchard will cover all the ground beneath the surface with one continued network of roots and fibres. The fallacy of the practice of spading small circles around trees is obvious, as the great mass of the roots extend far beyond. Manuring the foot of the stem only, which is often done, is equally useless.

Practice has fully proved the importance of keeping the whole surface of the ground clean and mellow, where young orchards or plantations of trees are set out. A mere surface covering of thin grass has been found to retard and almost wholly prevent growth. A young peach tree, growing in grass, will not make a shoot more than three or four inches long. Well cultivated, it will grow three or four feet.

THE STEM AND BRANCHES.

As roots are *annual*, *biennial*, or *perennial*, as they continue living *one*, *two*, or *more* seasons; so the stem is *herbaceous* or *woody*, as it grows only one year or more—in the latter instance hardening into wood. A perennial root may have an annual or herbaceous stem, as the peony and lily. Woody plants, when small, are called *shrubs*, as the rose, honeysuckle, and lilac, or the gooseberry and currant. When large, they are trees, as the apple, the pine, and the oak. A dwarf apple, made small by budding any common

sometimes it is as badly mutilated as in fig. 43. Fig. 44 exhibits the same as removed by careful nurserymen. As it is impossible, in ordinary practice, to secure all the roots, there must be a corresponding shortening back of the shoots at the top, when the tree is set out, in order that the reduced quantity of roots may have no more buds and branches to supply with sap than they can sustain.

variety on the small Paradise stock, becomes a shrub. Stems are *twining*, as in the morning glory or bean; and each twining species always turns to the right, or to the left, and never changes, and nothing can make them twine in a different direction from their natural course. They are *climbing*, as in the grape vine and pea; *creeping*, as in the white clover. What are termed

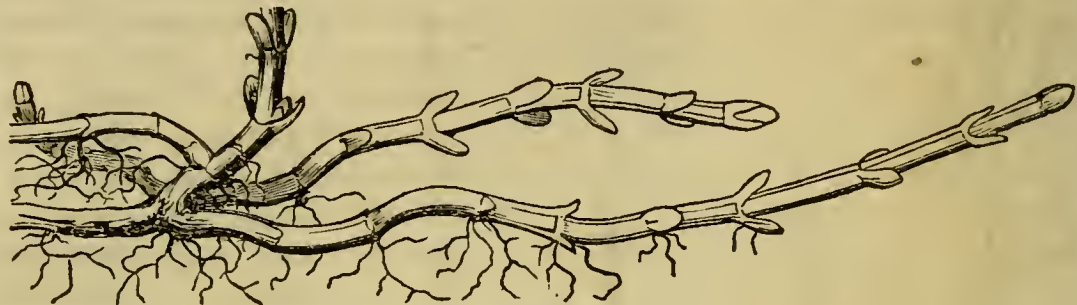


Fig. 45.

creeping roots, as in the Scotch rose, the couch grass, or peppermint, (fig. 45,) are only creeping stems beneath the surface. Sometimes such stems become enlarged at the growing ends, and produce *tubers*, as in the potato, which is nothing but a thickened subterranean stem, the *eyes* being the *buds*. *Suckers* are branches springing up from underground stems; sometimes they come from mutilated roots. *Runners* are creeping stems, which strike roots at the tips and form leaves there, as in the strawberry. A single strawberry plant will in this way produce a hundred new ones or more in a single summer, and by care ten thousand by the end of the second year, a million the third, and so on. A *bulb* is a very short subterranean stem, with roots beneath, and throwing out leaves above, as the onion, tulip, and lily. Or, it may be regarded as a bud only, with roots and a thick fleshy covering.

Outside-growing woody stems, (or those which are two-cotyledoned,) are made up of the bark, wood, and pith. The *liber*, or inner bark, lies next the wood; and the rind or outer bark, on some trees, forms gradually into a thick, hard, corky substance, termed *cortical layers*. When young it is the *green bark*, and performs the same office in the growing plant as the leaves. The sap descends from the leaves through the inner bark, and deposits new layers of both wood and bark yearly. Thus the newest bark is inside, and the newest wood outside. The liber forms the *bast* or bass matting, obtained from basswood by soaking in water; and in flax and hemp, herbaceous plants, it constitutes the material made into cordage.

Wood. The outer wood, which is the youngest and freshest, is called the alburnum or sap wood—through this, the sap ascends into the leaves. The heart wood is the older, harder, and usually more dried portion; and it bears the same relation to the sap wood, as the cortical layers do to the liber. The *pith*, in young plants, holds a useful place for retaining moisture; but in old trees it becomes dry, shriveled, and useless, and trees grow as well where it has been cut out.

Branches. These consist of *main branches* or limbs; *secondary* or

smaller branches; and *shoots*, or the extremities, being one year's growth. *Thorns* are a modification of branches, and are sometimes simple, as in the common thorn; or branched, as in the honey locust. Ungrafted pear trees often present all the intermediate forms between perfect branches and perfect thorns. *Prickles* grow only from the bark, and when the bark is stripped off they are all taken off with it, but thorns remain attached to the wood.

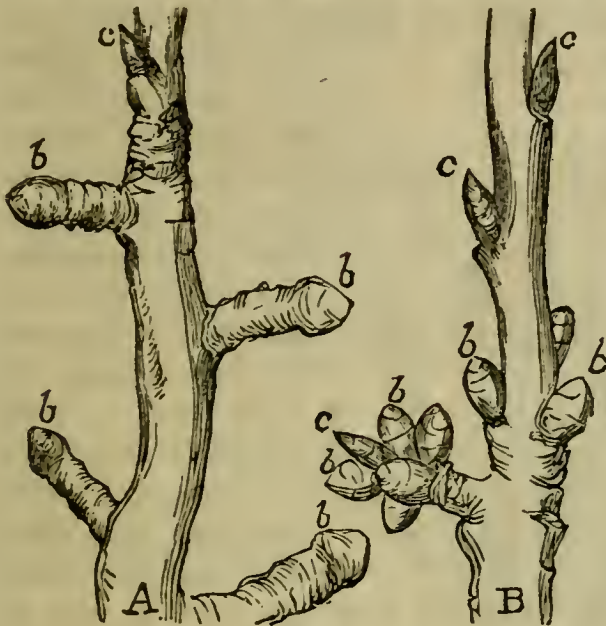


Fig. 46.

Buds are of two kinds, *leaf* and *flower*. The former grow into branches, the latter produce fruit. To distinguish these buds is of great importance to the cultivator of fruit trees. In fig. 46, A. represents a portion of the branch of a pear tree, and *b. b. b.* are flower or fruit buds on the extremities of short spurs termed fruit spurs; and *c.* is a leaf bud on a one-year shoot. B. exhibits these two kinds of buds as seen on the cherry, *b. b.* being the rounded fruit buds, and *c. c.* the sharper leaf buds.

Causes of this difference.—

When young trees grow rapidly, all their buds are leaf buds; when they become older and grow more feebly, many of them become flower or fruit buds. One is the result of rapid, and the other of slow growth. Check the growth of a young tree by transplanting it, or by root-pruning, or by neglecting cultivation, or allowing it to grow with grass, and many fruit buds will be found upon it, and it will bear early. But as the growth is unnaturally enfeebled, the fruit is not always of the best quality. The natural diminution of vigor from increased age furnishes better fruit. Fruit buds are likewise produced by checking the free flow of the sap in grafting on dissimilar stocks, as for example the pear on the quince, producing dwarf pear trees. The fruit spurs shown by A., fig. 46, are nothing more than stunted shoots, originally produced from leaf buds, but which, making little growth, have become fruit bearers. The vigorous one-year shoot of the cherry, B., is mostly supplied with leaf buds, but the short spurs on the second year's wood, which are but dwarfed branches, are covered with fruit buds, with only a leaf bud in the centre.

It is not, however, always the slowest growing kinds of fruit trees that bear soonest. There appears to be a constitutional peculiarity, with different sorts, that controls the time of beginning to bear. The Bartlett, Julienne, and Howell pears, vigorous growers, bear much sooner than the Dix and Tyson, which are less vigorous.

By pruning away a part of the leaf buds, the fruitfulness of a tree may be increased ; and by pruning away the fruit spurs, bearing may be prevented, and more vigor thrown into the shoots.

Buds are *lateral*, when on the side of a shoot ; and *terminal*, when on the end. Terminal buds are nearly always leaf buds, and usually being larger and stronger than others, make stronger shoots. All buds are originally formed as leaf buds, but the more feeble are generally changed to fruit

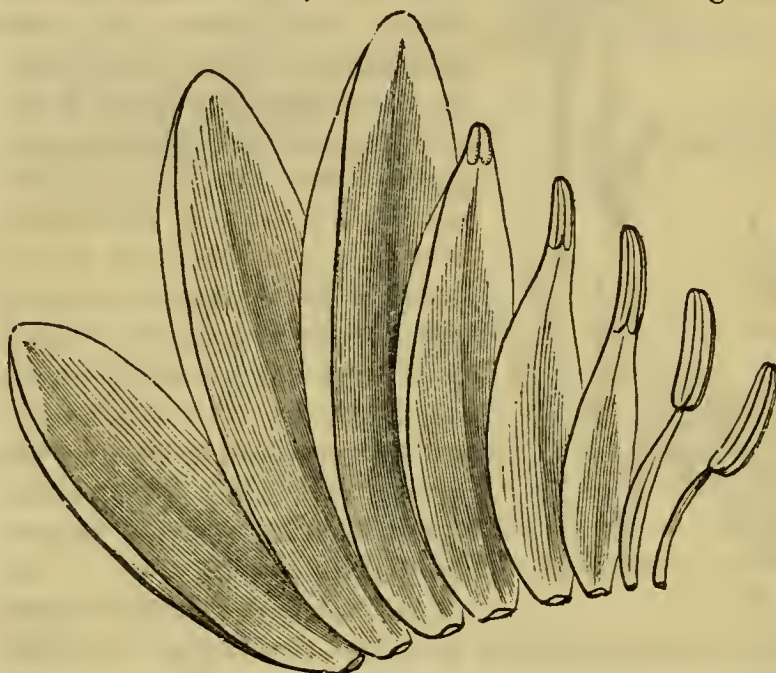


Fig. 47.

buds. Now, it happens that on many kinds of trees, the feeble buds are on the lower parts of shoots, (by *lower* is meant furthest from the tip,) and these consequently often change to fruit buds. This change in some kinds of trees, as cherry and plum, takes place the year after they are formed ; and in others the same year, as for instance in the peach and apricot.—

This transformation is a very curious process, and is effected by the embryo leaves changing to the organs of the flowers. A contrary change of stamens to flower leaves produces double flowers. Fig. 50 represents all the different gradations of such a change, from perfect stamens to perfect petals, as occurring in the *Nymphæa* or Pond lily.

Latent Buds. Only a small proportion of all the buds formed, grow the second year ; the rest remain dormant or latent for years, and are made to grow and produce shoots only when the others are destroyed.

Adventitious Buds are produced by some trees irregularly any where on the surface of the wood, especially where it has been mutilated or injured ; and they form on the roots of some trees which are cut or wounded. In these cases such trees may be usually propagated by cuttings of the roots.

Leaves. These are usually made up of two principal parts, viz: the *framework*, consisting of the leaf-stalk, ribs, and veins, for strengthening the leaf, and supplying it with sap ; and the *green pulp*, which fills these meshes or interstices. The whole is covered by a thin skin or *epidermis*. The green pulp consists of cells of various forms, with many air-spaces between. The cells are commonly placed very compactly together on the upper side of the leaf, and more loosely, or with air-spaces, on the lower side—hence the reason

that leaves are usually lighter colored below. Fig. 48 is a highly magnified section of a leaf, showing the green cells, air spaces, and epidermis above and below. Leaves have also *breathing pores*, through which moisture and air are absorbed, and vapor given off. They are so small as to require good microscopes to discover them; and they vary in different plants from 1,000 to

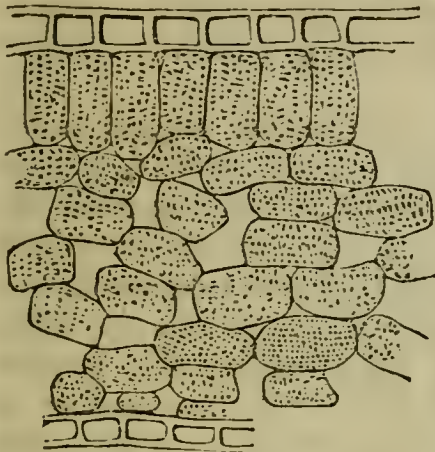


Fig. 48.

170,000 on a square inch of surface. The apple and pear have about 25,000 or 30,000, and the white lily about 60,000 to the square inch. They are mostly on the lower side of the leaf. Fig. 49 represents the pores on an apple leaf. Leaves are a contrivance for increasing the surface exposed to the air and sun. Prof. Gray says the Washington elm at Cambridge was estimated to bear "seven million leaves, exposing a surface of 200,000 square feet, or about five acres of



Fig. 49.

foliage." A common fully grown apple tree has from three to five hundred thousand leaves, and the breathing pores they all contain must be more than a thousand million.

THE PROCESS OF GROWING.

Water is absorbed by the roots, and undergoes a very slight change; matter from the cells of the root is added, (as sugar, in the maple,) and it is then denominated *sap*. It passes from cell to cell upward, through the sap-wood, until it reaches the leaves. The cells being separate, and not continuous tubes, it is conveyed from one to another through a great number of partitions; in the basswood, for example, which has very long cells, it passes about 2,000 partitions in rising a foot.

When the sap enters the leaf, it emerges from the dark cells through which it has been passing, and is spread out to the light of the sun. A large portion is evaporated through the breathing pores, and it becomes thickened. The carbonic acid of the air, and the small portion of the same acid which the sap contained before it entered the roots, now forms a combination with the oxygen and hydrogen of the sap, and produces the triple compound of oxygen, hydrogen, and carbon, which constitutes woody fibre—the oxygen of the carbonic acid escaping. This escape of oxygen may be seen by placing leaves under water in the sunshine. Innumerable little bubbles of oxygen form on the surface of the leaves, and give them a silvery appearance. If continued, air-bubbles rise in the water, and if a glass tumbler full of water is inverted over them, pure oxygen in small quantities may be procured. A plant growing in carbonic acid gas, takes the carbon, and leaves the oxygen; in this way changing the acid to oxygen. Growing plants thus perform a most important office by purifying the atmosphere. Fires in burning, and animals

in breathing, consume carbon, combine it with oxygen, and then throw off the carbonic acid thus formed. This acid, being poisonous, would after a while become so abundant as to prove injurious to animal life, were it not for the wise provision by which plants consume it and restore the oxygen. Connected with this, there is another interesting proof of creative design. If there were no carbonic acid in the air, plants could not grow; but one twenty-five hundredth part, as now exists, supplies food for vegetation, and does not affect the health of animals and man.

Leaves require sunlight to enable them thus to decompose carbonic acid. It does not go on in a dark room, or in the night. An excess of oxygen in a plant makes it pale in color, and either sour or insipid in taste; an excess of carbon makes it dark green, and bitter. Hence, a potato, growing in a dark cellar is pale or white; hence the process of blanching celery and sea-kale to remove the bitter taste. Hence also the reason that a potato, too much exposed to the sun, imbibes too much carbon, and becomes bitter. Hence too, why strawberries and other fruits are more acid when hid by leaves or in cloudy weather; and why apples on the thickly shaded part of an unpruned tree are more sour and imperfect, than where, by good pruning, the leaves which feed them are fully exposed to the light, and receive a proper share of carbon.

Sap, on entering the roots, always contains some mineral substances in solution, as potash, lime, silex, &c., which is carried up into the leaves; and when a part of the moisture is evaporated, a large portion of the mineral substances is left there. This is the reason that leaves contain more than the other parts; in most of our forest trees, for instance, the leaves contain about ten times as much mineral substances as the wood. When vegetable substances are burned, these mineral parts remain behind and form *ashes*. It will be seen from what has just been said, that ashes from leaves, or leaves without burning, afford the most ashes or mineral ingredients, and thus trees return, by the annual fall of the leaf, much of these substances which have been taken from the soil.

The sap, thickened and prepared in the leaves, then descends through the inner bark, forming a layer of fresh, half liquid substance, between bark and wood, called the *cambium*—most of which, by hardening, constitutes a new layer of wood—a small part making a new layer of bark. The annual deposits of new wood, form distinct concentric rings, by which the age of the tree may be counted when the trunk is cut through. That this is the mode by which wood in exogenous trees is deposited, may be proved by an interesting experiment, performed by slitting the bark of a young tree, lifting it up carefully, and then slipping in between wood and bark a sheet of tin foil, and binding the bark on again. The bark will deposite layers of wood *outside* the tin foil, and none inside; and after a lapse of years the concentric rings will be found to correspond exactly with the time since the operation was performed.

The descent of the forming wood in the inner bark may be shown by tying a ligature around a growing branch, or by removing a ring of bark. The downward currents are obstructed, like that of a stream by a dam, and the new wood accumulates above the obstruction and not below, as shown in fig. 50.

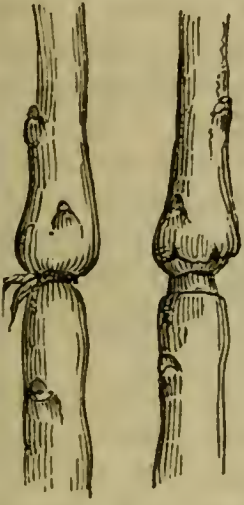


Fig. 50.

In Grafting, it is essential that some portions of the cut surfaces uniting the stock and shoot, should be placed so accurately together that the sap may flow up through the alburnum or sap wood from the stock to the shoot, and back again through the inner bark of the shoot to that of the stock. When this union takes place, the rest of the cut faces, even if some distance apart, are soon cemented by the newly forming wood, which fills all the vacant space.

In Budding, the newly set bud is cemented to the wood of the stock by the cambium, which hardens and fastens it only. The next spring the bud grows, forms a shoot, and the two portions become securely united by the new wood.

Unless there is enough of the cambium to cement the wood to the stock, the operation cannot succeed; and this is the reason why, with vigorously growing stocks, which are depositing much, budding succeeds much better than with feeble growers, where but little of this cement exists.

The rapidity with which leaves exhale moisture, is shown by severing them from the stem in dry weather. They soon wither and become dry. Cut a shoot from a tree, and throw it down in the sun's rays, and it will soon shrivel, in consequence of the rapid escape of its moisture through the leaves. But first cut off all the leaves, and the shoot will remain plump a long time. This is the reason that it becomes necessary to remove the leaves at once from scions cut for budding.

Hence also the reason that plants and trees are so liable to die, if transplanted with the leaves on; a disaster which may be partially prevented in trees by removing the leaves; and in plants or cuttings with leaves on, by covering them immediately with a bell-glass, which by holding the watery vapor, keeps a humid atmosphere about them. It is for this reason, also, that when young trees lose a large portion of their roots, a part of the top must be cut off, to prevent the heavy evaporation which all the leaves would occasion.

A sunflower plant, about three feet high, was found to exhale from its leaves in very dry weather between one and two pints of water in a day. A bunch of growing grass, placed beneath a cool inverted glass, soon covered the sides of the glass with condensed drops from the vapor, and in a few minutes the water ran down the sides. These experiments show the great amount of water needed by growing plants; and also prove the great mistake which some persons commit, by leaving weeds to grow to shade the ground and keep it moist, while these weeds are actually pumping the water rapidly up from the soil, and dissipating it through their leaves.

In the spring, before the leaves expand, but little evaporation takes place from the bark, which is the reason that newly transplanted trees are water-soaked and injured at the roots, by watering them faster than they can carry off the moisture. Washing the stems should be the only watering at this period. But when the leaves are expanded, a more copious application becomes useful; but it should never be performed, as so frequently done, by flooding the tree at one time and allowing it to dry at another; or by pouring the water on the surface, which it hardens, and never reaches the roots. Keeping the soil finely pulverized, and if necessary, with an additional shading of hay or straw thickly spread over the surface, will preserve a sufficient and uniform degree of moisture; or if watering is given, the earth should be first removed from the roots, the water poured on, the earth replaced, and a mulching applied.

The absolute necessity of leaves to the growth of the tree, is shown by the fact that when leaves are stripped off by caterpillars, the tree ceases to grow till new ones expand; and if often repeated the tree perishes. Canada thistles and other noxious weeds are easily destroyed by keeping the leaves buried for one season by frequent plowings, or destroyed by constantly cutting off at the surface on their appearance. When the leaves of young pear stocks cease to act, in consequence of leaf blight, the tree no longer grows; cambium ceases to form, and they cannot be budded. An interesting illustration of the office of leaves occurred to the writer a few years since:—A yellow gage plum tree set a heavy crop; but when the fruit was nearly grown, all the leaves dropped. The fruit remained green, flavorless, and stationary, until a new crop of leaves came out. It then finished growing, acquired a golden color, and a rich and excellent flavor.

Perfect fruit requires perfect leaves; and thick, crowded, half grown leaves, give small fruit with poor flavor. The great object of pruning, and of summer pruning especially, is to give plenty of good, healthy, and not crowded foliage, and the crop will also be good.

The *green bark* of trees and plants performs the same office as leaves; and in connection with the cells adjoining, appear to fulfill sometimes an office which the leaves fail to accomplish. This is, *preserving the identity of the species or variety*. For example, bud a *pear* tree on a *quince*. All the wood above the place of union will be pear wood; all below will be quince. All the supplies which come from the pear leaves, change to quince wood the moment they pass this point; and if the budding is performed when the quince stock is smaller than a quill, yet all the wood below, when it becomes a large tree, will still be perfect quince wood, as is shown when any chance shoots or suckers spring up from below. Or, bud for example the Northern Spy, which has dark bark, with the Bellflower, which has yellow; and again, bud the Snow apple, which has dark colored bark, on the Bellflower, and the light colored Sweet Bough on this—each being an inch above the last budding. Successive dark and light bark, the peculiarity of each variety, will

remain as long as the tree grows; showing conclusively that the bark performs the finishing process in the manufacture of the new wood.

FLOWERS.

The object of the flower is the production of seed, and through them the reproduction of new plants. The protecting organs of each are, the calyx,



Fig. 51.

outside, which is usually, not always, green; and the *corolla*, or flower leaves, of various colors, which are next within the calyx. These two are sometimes called the *floral envelopes*; the *essential* parts of the flowers are the *stamens* and *pistils*. Fig. 51 represents an enlarged flower of the cherry, cut through the middle, showing the small calyx, the large

corolla, the many stamens, and the single pistil. Fig. 52 is a magnified flower of the purslane, showing several pistils. The head of the stamen, (*b*, fig. 53,) is called the *anther*. It contains a powder called *pollen*, which it discharges by bursting open, the pollen being the fertilizing matter, essential to the production and growth of the new seed. The threadlike stalk of the stamen (*a*)

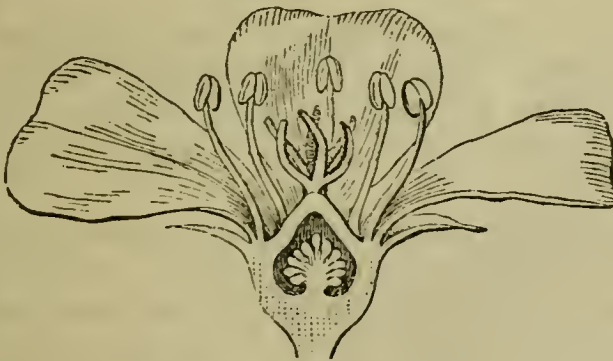


Fig. 52.

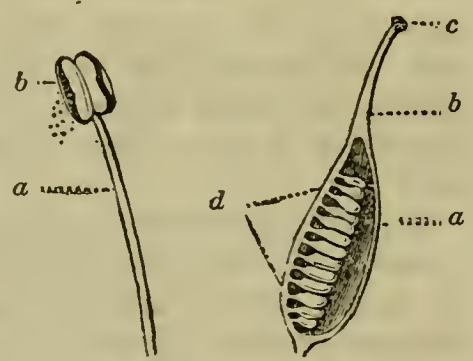


Fig. 53.

Fig. 54.

is called the *filament*. The pistil (fig. 54) consists of the *stigma*, *c*, at the top; the *style*, *b*, its support; and the *ovary*, *a*, or future seed-vessel. The *ovules*, *d*, are the rudimentary seed. The pollen of the stamens falls on the stigma, and the ovules are fertilized or impregnated, and become seeds.

Sometimes the stamens and pistils are in different flowers, on different parts of the plant. A familiar instance occurs in Indian corn, the "silk" being the pistils, and unless these are impregnated by the pollen of the anthers at the top, no grains of corn will be produced.

Sometimes the staminate and pistillate flowers are not only separate, but are on distinct plants, as the Buckthorn, Buffalo berry, and Hemp. The

pistillate flowers are said to be *fertile*, and the staminate *sterile*, and both must be planted near each other in order to obtain fruit or seed.

Sometimes the stamens, when not absent, are so defective, that they cannot fertilize the pistils, or but imperfectly. This is the case with what are termed pistillate strawberries, such, for example, as Hovey's Seedling and Burr's New Pine. In order to produce good crops, some other variety that has perfect flowers or perfectly developed stamens, as the Scarlet, or Wilson, must be planted near, from which the wind may waft or the bees carry the pollen to the imperfect flowers. Fig. 55 represents the flower of a



Fig. 55.



Fig. 56.

staminate strawberry, or one where stamens as well as pistils are perfect; fig. 56 is a pistillate flower, the stamens being small, and containing but little pollen in the anthers. Fig. 57 is an enlarged view of the former, *a* being the

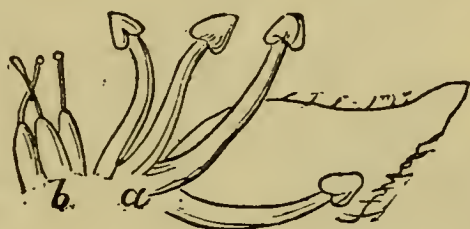


Fig. 57.



Fig. 58.

stamens, and *b* the pistils. Fig. 58 is a flower of Hovey's Seedling, showing at *a* the dwarfed and useless stamens. Sometimes very favorable circumstances will enable these dwarfs to afford a portion of pollen, and some berries will be produced, even if they are remote from other fertilizing varieties.

Raising new varieties of fruit by crossing, is accomplished by fertilizing the pistils of one sort by the pollen from another. It was originally performed by cutting out the anthers of flowers with scissors, to prevent the influence of these stamens, and then bringing the pollen of the other sort, and applying it artificially. Fig. 59 is a pear flower, as

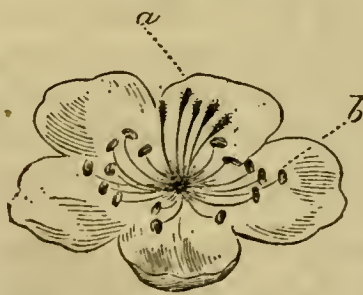


Fig. 59.



Fig. 60.

usually seen; *a*, the pistils, and *b*, the stamens; and fig. 60 is the same with the stamens clipped out. This being a very tedious process, is now discarded, and the two sorts are planted close

together, so that the branches shall intermingle, and produce cross-fertilization without any further labor. It was in this way that Dr. Kirtland produced the seed of all his new and excellent varieties of the cherry.

Some plants, as the squash, become cross-fertilized so easily, by the presence of bees, which carry pollen from one flower to another, that caution is required, and remote planting of the different sorts, to prevent those varieties from mixing which it is desirable to keep separate and distinct.

SPECIES AND VARIETIES.

Plants and animals, of one species, are supposed never to produce a progeny of a different, no matter how many successive generations may intervene. For example, a wolf never brings forth dogs, a cow never produces sheep, and never has, so far as we know, since the creation. Each produces "after its kind." These are therefore *distinct species*. But of some there are many breeds; of sheep, for example, there are the Merino, the Cotswold, the Southdowns, &c., which are *varieties* of the same species, the changes being gradually and slowly produced by successive generations. So also there are many varieties of dogs and of cattle.

In the same way the seed of a pear never produces an apple, these being distinct species, but it produces many different sorts of pears, which are only varieties. So the apple produces innumerable varieties, but it can never yield a pear, a quince, or a peach. Sometimes, when varieties have remained a long time distinct, without much variation by successive planting, they are termed races. For instance, the White flint, Mediterranean, and other varieties of *wheat*, and the King Philip, Dutton, Gourd seed, and other sorts of corn, may be mentioned. The races of men are analogous, "all nations having been created from one blood."*

A knowledge of the distinction between species and varieties, now so well pointed out by botanists, would prevent many of the errors which some have adopted, that plants of one species would change to another, as for instance, a useful crop to a weed with which it is liable to be much infested, and the seeds of which are easily scattered in various ways. Some erroneously suppose that wheat changes to chess, and others believe that barley changes to oats, and rye to darnel, although these are all quite distinct species.

This knowledge of the character of species, and their affinities, would frequently prevent the blunders which grafters make, in trying to make the peach grow on the willow or butternut; or the rose on the sumach. Budding and grafting succeed best when performed on plants of the same species, as apples on apples, peaches on peaches, and pears on pears. But sometimes the operation succeeds with different species of the same genus, as the pear on the apple, and the cultivated cherry will grow well on some wild species. Some varieties of the pear grow well on the large sorts of the quince. De Candolle succeeded, in rare instances, in making the *Bignonia* grow on the Catalpa, the Olive on the Ash, and the Lilac on the Philly-

* Some persons have formerly endeavored to show that the human race might have had more than one origin; but of late years the proofs that it sprung from one source have accumulated to such an extent and magnitude as to be no longer denied by persons well informed on the subject.

rea, plants of different genera but of the same natural order, but they soon died. As a general rule, it may be said that different species work imperfectly, and often fail to adhere at all; that different genera, of the same natural order, in rare instances, may be grafted or budded, and live for a time; but no instances are known where trees of different natural orders can be made to unite.

THE GRASSES.

THE annual value of the grass crop in the United States, exceeds three hundred million dollars. An improvement, therefore, effected by procuring the best sorts for sowing, or by a better system of management, that shall increase the average crop but *one-tenth*, will add to the aggregate product no less than thirty millions. There is no question, however, that a much greater increase than this might be readily effected; for while the average product of hay per acre is not more than a ton or a ton and a half, the best farmers cut from two to three tons. There is nothing, therefore, but a want of intelligence and skill, to prevent an increase of value amounting yearly to at least three hundred million more. The subject is well worthy of more consideration than it commonly receives.

There are two ways of increasing the crop. The first is, to procure the best kinds of grasses; the second, to improve the cultivation or management. A notice of some of the most valuable species, with their qualities and characteristics, may assist in promoting the desired improvement.

The number of grasses which are highly esteemed in this country, for meadows and pastures, is very few. With many farmers, timothy, red-top, and June or Kentucky blue grass, constitute the entire catalogue. There are many hundred known species, some of which, if they could be subjected to proper cultivation, would doubtless prove valuable; and the enterprising cultivator who, by undertaking the task, should introduce, out of the great multitude, but one equal in value to timothy or Kentucky blue grass, would richly deserve the thanks of the whole country. The object of this brief article is to point out those of most merit which have been already tried. Its limits prevent a scientific description of the minute parts of the flower, by which alone the numerous species are accurately distinguished from each other. The cuts which are given are correct representations of the most valuable kinds, and, carefully observed, with a little additional description, will enable the reader to recognize them at once.*

There are a few general terms that every one should understand. For example, the head of wheat, barley, rye, or timothy grass, growing in an

* For the cuts of Grasses illustrating this article, we are indebted to the courtesy of CHAS. L. FLINT, Secretary of the Massachusetts State Board of Agriculture, for whose excellent Treatise on "Milch Cows and Dairy Farming," they were originally prepared.

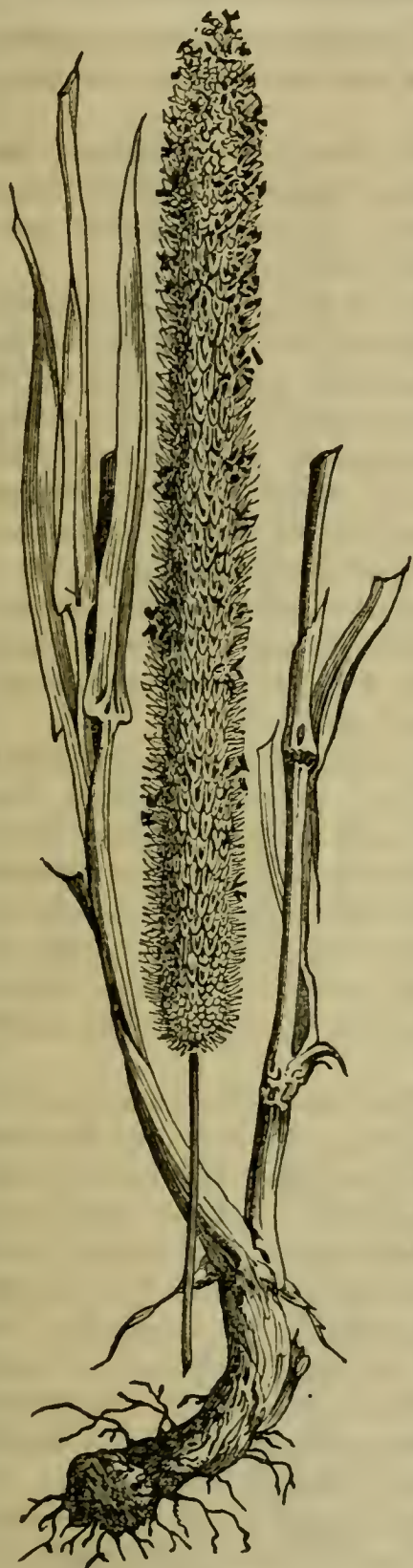


Fig. 1—TIMOTHY.

oblong, compact form, is termed a *spike*; and the loose and spreading head of oats, and June grass, is called a *panicle*. The *spikelets* are the small spikes on the panicles, often consisting of several seeds and chaff, as in the chess plant, where the spikelets are about an inch long, and often hold a dozen seed; or in the June grass, where they are only about the tenth of an inch long, and contain five or six seeds. A spike, as in timothy grass, is also composed of spikelets, but they are less distinct or more crowded together.

DESCRIPTION OF THE MORE COMMON SPECIES.

Timothy, or *Herd's grass* of New England, and *Cat-tail* of Britain—*Phleum pratense*, fig. 1. (The Herd's grass of Pennsylvania and the Southern States is the Red-top, wholly different from this.) The cut affords an accurate representation of this grass when in flower. The root is perennial, and often slightly bulbous. This is probably the most valuable of all cultivated grasses, and especially so for hay. It is rather coarse and harsh if left uncut too long, but mown when in blossom, or immediately after, it constitutes excellent fodder. Another advantage of cutting rather early is the after-growth, which is tardy and scant if the seeds ripen. The chief objection to this grass is the want of a good second crop; but when sown with clover, the latter supplies the deficiency, and when, in a year or two, the clover disappears, June grass often comes in and is a valuable successor, where pasturage is the object. It succeeds best on rich and rather moist soils. It is an admirable crop for reclaimed marsh or swamp. At least one peck of seed is sown by good farmers, per acre, and a larger quantity will give a heavier crop, and softer and finer hay. It may be sown as a crop by itself, either in autumn or early in spring, and brushed or very lightly harrowed in. If early in autumn, it will give a good crop the next year; and a moderate or fair one the same season, if sown in spring.

Three tons of hay to the acre, when plenty of seed has been used on fertile land, are not rare. It gives a large product of seed when allowed to ripen, varying from ten to twenty bushels per acre.

This grass has been called Herd's grass, from Herd, of New England, its supposed discoverer; and Timothy, from Timothy Hanson, of Pennsylvania, who largely cultivated and introduced it to notice. Who will introduce another grass of equal value, from the hundreds of wild species?

Meadow Fox-tail Grass—Alopecurus pratensis, fig. 2. The flowers grow in a spike, somewhat like timothy, but the spikes are shorter, and feel soft to the touch, while that of timothy is rough. The spikes appear earlier, but it grows too thin and light for hay; it makes, however, a fine early pasture. It would probably be a good mixture with other grasses in seeding down to permanent pasture. Flint says that on account of its light and bearded chaff, there are but five pounds in a bushel, and 76,000 seed to an ounce. This would be six million to a bushel, which would seed about an acre.

The *Floating Fox-tail—Alopecurus geniculatus*—resembles the preceding, but is later, and grows in water. It is found in wet meadows, ditches, and marshes. It is of no value, unless possibly it be for furnishing pasture on flooded grounds, where other grasses will not grow.

Cut-grass or False Rice—Leersia oryzoides. Flowers in rather one-sided panicles, coming out late in summer, stems two or three feet high; the sheaths of the leaves which clasp the stems are exceedingly rough when drawn downward through the hand, owing to very small points or minute prickles pointing downwards. The general color of the heads or panicles is a yellowish green. It grows in swampy meadows, and along the margin of turbid streams. It is a weed in the North, but is cultivated to some extent at the South, and cut as hay. It will not flourish on dry or drained land, and hence thorough draining will destroy it.

Red top, Herd's grass of Pennsylvania and the South—*Agrostis vulgaris*, fig. 3. The flowers are in a loose, open panicle; the spikelets are one-flowered or one-seeded; and the whole head has usually a redish purple color, very conspicuous where growing in quantity in meadows. It grows about two feet high. Roots creeping. This grass is widely known. In England it is called *Fine Bent*. It succeeds best on rather moist soils, where it is one of the most valuable grasses, although as a whole much inferior to timothy. It is well adapted (like June grass) to sow with the latter, and forms a dense sward over the surface, which otherwise is left bare after cutting timothy for hay. It is perennial, and makes good permanent pastures, in which it should be fed down so as to prevent going to seed, which renders it unpalatable. It is one of the best lawn grasses, and, sown with June grass and white clover, forms with weekly mowing, a beautiful green carpet. The seed is small, and four to six quarts usually seeds an acre.

English Bent or White-top—Agrostis alba—resembles Red-top in general growth, but differs in having a light green and sometimes faintly purple



Fig. 2—MEADOW FOX-TAIL.

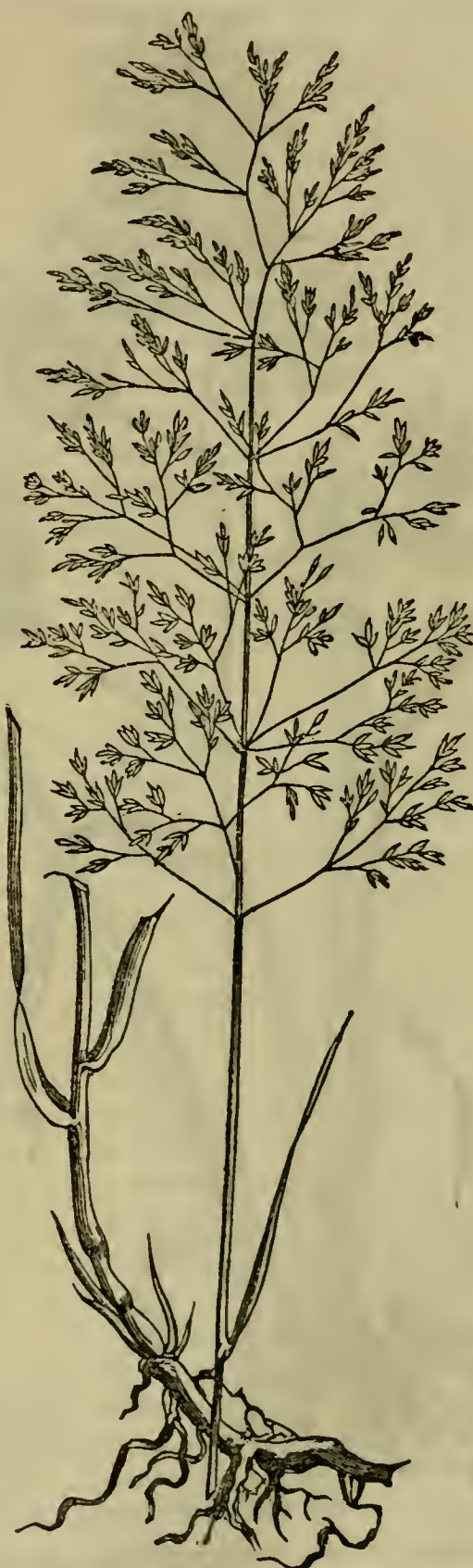


Fig. 3—RED-TOP.



Fig. 4—ORCHARD GRASS.

panicle, and by the roughness of the sheaths of the leaves. It is of little or no value. A variety known as the *Fiorin* grass—*A. alba*, var. *stolonifera*)—was once in high repute, but it is now regarded as little else than a weed, difficult to eradicate, on account of its rooting recumbent stems. It grows in wet places.

There are several other species of *Agrostis*, but they have not been found valuable.

Nimble Will—*Muhlenbergia diffusa*—has a slender, branched stem, with several narrow, slender panicles; the chaff has a slender beard about a twelfth of an inch long. In Kentucky and Tennessee, it forms a pasture grass of some value, but cannot be recommended for sowing.

Blue Joint grass, or *Canadian Reed grass*—*Calamagrostis Canadensis*—much resembles an *Agrostis* in its general character; it is a large grass, sometimes growing three or four feet high. The panicles are often of a purple hue; are stiffly erect, at first contracted or narrow, somewhat resembling a spike, but afterwards more spreading. The inner chaff has a fine bristle on the back, a little below

the middle. It is common on low grounds in many places, and is regarded as a valuable grass, being both nutritious and palatable. It is said to be



Fig. 5.—JUNE GRASS.

abundant and much esteemed about Lake Superior. It deserves more attention from agriculturists.

Sea-Reed—*Calamagrostis arenaria*. The panicle is long and close, or spike-like, nearly white, leaves smooth, root (rhizoma) branching and creeping extensively in the sand. Often two or three feet high. It is not cultivated for agricultural purposes, but by holding the sand on the seacoast, where it would otherwise drift, is of great value. It has been extensively planted along the shores of Cape Cod, and has saved buildings from being buried by sand.

Orchard grass—*Dactylus glomerata*, fig. 4—is accurately represented in the cut, as it appears when fully grown, but when the panicle first appears, the parts are more closely crowded into nearly one cluster. It flowers earlier than timothy, or about the time of red clover, which renders it better than timothy in this respect to mix with clover. It is, however, objected to as hay, on account of its coarseness. Its great value is for pasture, and it should be kept eaten rather close for this purpose. The root is perennial, and it should be sown thickly, to prevent the irregular tussocks where thinly covering the ground. It endures drouth, and no grass is equal to this for growing in the shade, whence its use in orchards, and its name. It is thought to produce more pasture per acre

than any other known grass. The seed are light and chaffy, and two bushels



Fig. 6—ROUGH MEADOW GRASS.

are required for an acre, if sown alone. It deserves more attention as a pasture grass than it generally receives.

June-grass, Spear-grass, or Kentucky Blue grass—Poa pratensis, fig. 5. The genus *Poa* comprises several valuable species, among which are the Rough-Stalked Meadow, and the Foul Meadow grass. All the species have panicles, and the spikelets usually have several flowers (or seeds) and are not often more than about one-eighth of an inch long. The leaves are generally quite smooth.

The June grass is readily distinguished by the minute cottony hair at the base of the inner chaff.

It varies much with the soil—where poor, it is small and insignificant, having little resemblance to the dense and luxuriant

masses presented on rich land. Its great value is for pasturage. It attains great perfection in Kentucky. It remains green all winter under snow, and furnishes early pasturage in spring, when a good autumn growth has been allowed. It requires two or three years to form a perfect turf, and is not well adapted, therefore, to short rotations. Four quarts of seed are commonly sown on an acre. It has been confounded by some with the Blue or Wire grass of the East, (*Poa compressa*), which is of less value, and in many places is regarded as a weed; seed of the latter

have been wrongly sold in market for Kentucky Blue grass.



Fig. 7—MEADOW FESCUE.



Fig. 8—RYE GRASS.

Fowl Meadow or *False Red-top*—*Poa serotina*. This grass has a large, loose panicle, and small spikelets of a redish brown or purple cast, giving it at first glance a resemblance to Red-top, (*Agrostis vulgaris*,) already described, but it is readily distinguished by having several flowers in the spikelets, (2 to 4,) while Red-top has one-flowered spikelets. It is perennial, and grows in wet meadows. Its name comes from the supposed fact of the seeds having been first scattered by ducks. It is one of the best of all grasses for wet meadows and pastures, which are occasionally overflowed, and should be mixed with other sorts for this purpose. The hay which it makes is of excellent quality, and may be cut late in the season without detriment.

Rough Meadow grass—*Poa trivialis*, fig. 6—much resembles June grass, but is distinguished by its slightly rough stalk, and by the panicle being rather slenderer and longer. It is not equal in value to the two preceding, but is a good grass to mix with others for seeding moist meadows, and it constitutes excellent hay.

Blue grass or *Wire grass*—*Poa compressa*—is readily distinguished by its flat stem. Its only value is on dry knolls and hill sides, where the soil is rather sterile, and where it forms rich and excellent but rather scant sheep pasture. The stems retain their color after the seed ripen. Its hardness, and the tenacity of life by means of its numerous creeping roots, render it a weed in cultivated fields.

The *Annual Poa*—*P. annua*—is a small species, the stalk from four to eight inches high, and distinguished by the very light green hue of the whole plant. It is an annual, although the plants often survive a winter. It grows along door paths and other frequented places, is of little or no value, and is only noticed to distinguish it from other grasses of more importance.

Poa nervata is a rather coarse, light green plant, the leaves slightly rough, and the panicle large, spreading, and branches becoming drooping. The small chaff is nerved or striped. It may prove of value for very wet or marshy places, although not equal to most other sorts in quality. The seed grows in great abundance and is easily thrashed or gathered.

Meadow Fescue—*Festuca pratensis*, fig. 7. The Fescue grasses, (or genus *FESTUCA*,) usually grow in panicles, and the spikelets have several flowers. It differs from *Poa* in not having any cottony web at the foot of the inner chaff, and in the spikelets being commonly larger, and harsh to the touch, and not soft, as in the *Poa*. The chaff is frequently furnished with a sharp, bristly point.

The *Meadow Fescue* is one of the most common as well as valuable species. It is perennial, grows two or three feet high, and, mixed with other grasses, is valuable for pasture. The *Tall Fescue* resembles this, but has a larger panicle, and is of little value.

Rye Grass, or *Perennial Rye Grass*, or *Darnel*—*Lolium perenne*, fig. 8—grows in spikes, and the spikelets are set alternately on the wavy or zig-zag main stalk, with their *edges*, and not flat sides, towards this main stalk. It grows



Fig. 9—ITALIAN RYE GRASS.

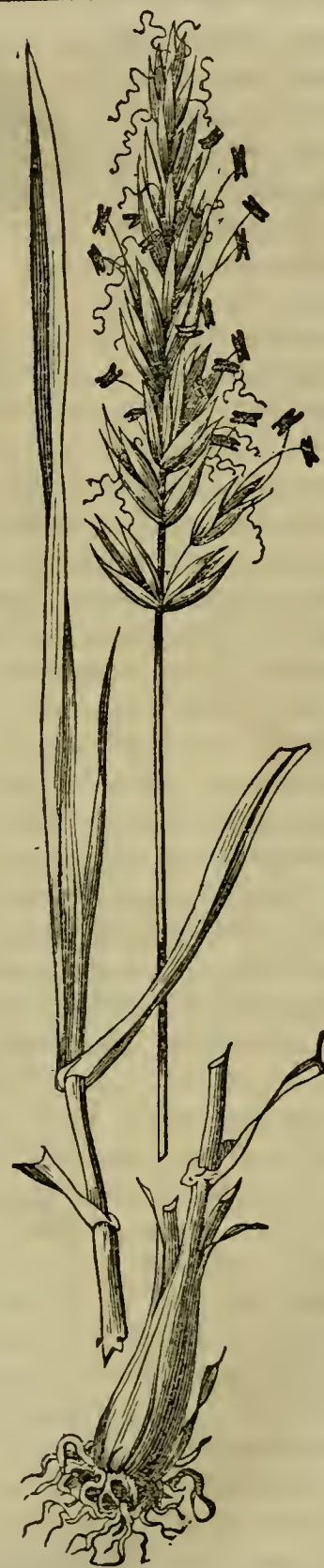


Fig. 10—SWEET-SCENTED VERNAL GRASS.

about two feet high. It has been long known and valued in England, and has been introduced into this country, but does not prove of equal value

here. It is not cultivated, but has found its way into grass fields. Another species, called

The Italian Ryegrass—Lolium italicum, fig. 9—has been more recently introduced, and is undergoing experiment, and high hopes are entertained of its value by some.

Sweet-Scented Vernal grass—Anthoxanthum odoratum, fig. 10—is distinguished from nearly every other grass by its fine perfume while drying. The panicle is contracted nearly to a spike, but in shady places is more spreading. It is of little value in agriculture, although recommended as a mixture for early pastures, and for lawns.

The Hungarian grass, or Hungarian millet—Setaria italica, var. germanica, fig. 11—being an annual crop, and not a grass for meadows and pastures, hardly belongs here. A brief notice may, however, be useful. There are several varieties of this species, and this is regarded as one of the best. The large compound spike is well represented in the accompanying cut. It has been long cultivated in Hungary as grain for horses, and has been within a few years extensively introduced into this country, and is highly valued by many.

Another millet, wholly unlike this in appearance, which has been much cultivated in Germany and to some extent in England, as food for fowls, called the *Common Millet*, is the *Panicum miliaceum*, and has a partly drooping and much branching panicle. It has hard yellow seed.

Indian Millet is several feet high, and is a *Sorghum*, or allied to broom-corn and Chinese sugar-cane. The *Polish Millet* is a small plant with finger-like spikes, and known as a *Digitaria*.

The limits of this article will admit of only a brief mention of such grasses as become WEEDS. The two worst, the *Chess*, and *Couch grass*, were described in the last number of the REGISTER, and a brief notice given of the *Fox-tail grass*. Seve-

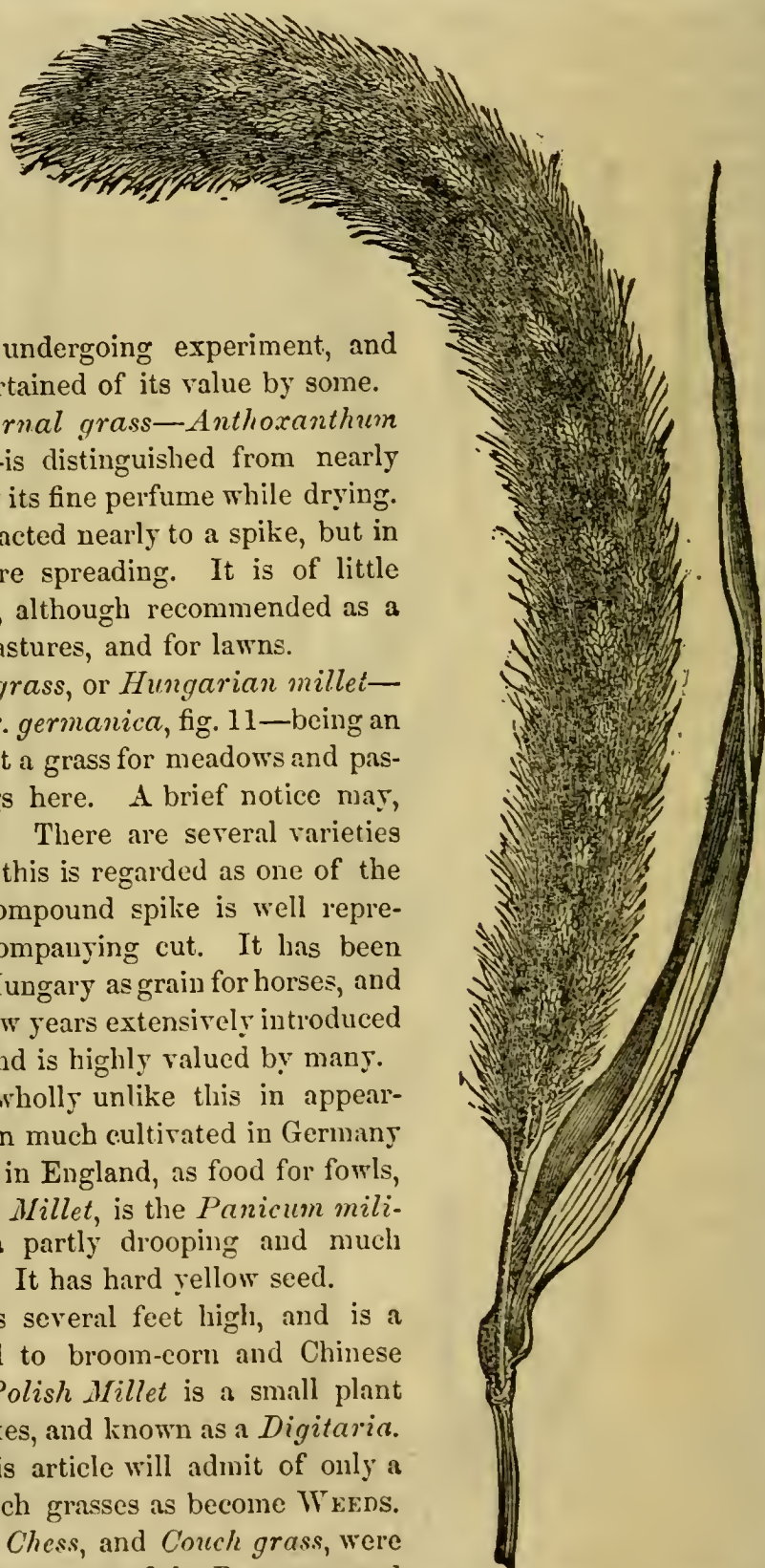


Fig. 11—HUNGARIAN GRASS.

ral species of the genus *Panicum* are weeds of more or less troublesome character, among which may be mentioned the *P. crus-galli*, and the *P. capillare*, (or the cocks-foot and old-witch grasses;) the *Digitaria* or crab grass, which is more troublesome towards the South; and the *Andropogon furcutus* and *A. scoparius*, or Indian grass, coarse brown plants, growing in poor neglected fields, and of which Dr. Darlington remarks, "no further evidence is required to demonstrate the unprofitable condition of the land, or the miserable management of the occupant."

The *Sedge grasses*, of which the genus *CAREX* forms the largest portion, grow mostly in wet places, and are coarse and of little value. Cattle eat them only when they can get nothing better. The sedges are eradicated by drainage and cultivation.

Of Forage plants, which are not grasses, the only ones cultivated successfully in this country, are Red and White clover. There are two or more varieties of the Red—the larger, coarser and later flowering, and the smaller, finer and earlier flowering. The latter is best for hay, the former for plowing in as green manure. The White clover is of little value in meadows, but forms a good mixture in pastures, and is especially valuable mixed with Red-top, for lawns requiring frequent mowing.

NUTRITIVE VALUE OF HAY.

According to the experiments of several eminent European agriculturists, 100 lbs. of good meadow hay are equal to about 90 lbs. of best cured clover hay, 300 to 500 lbs. of rye straw, (varying with time of cutting, &c.,) 200 to 400 lbs. of oat straw, 200 to 300 lbs. of ruta bagas, 250 to 400 lbs. of mangold wurtzels, 200 to 300 lbs. of carrots, 150 to 200 lbs. of potatoes, 30 to 60 lbs. of beans or peas, 50 to 60 lbs. of Indian corn, 65 lbs. of buckwheat, 35 to 75 lbs. of barley, 40 to 80 lbs. of oats, 30 to 70 lbs. of rye, 30 to 60 lbs. of wheat, and 40 to 100 lbs. of oil cake.

MANAGEMENT OF GRASS LAND.

The limits of this article will allow only a brief outline of the essential requisites for growing heavy crops of good grass.

The *first*, is a rich soil. Every farmer has observed the great difference in the crop on a poor knoll, and on a manured, fertile, or moist spot. Land laid down to grass should, therefore, be in the best order; and as most grass roots do not run deep, a surface manuring on heavy soils, or a coating turned in with a gang-plow on lighter land, would be very useful before seeding.

Thick seeding is the next requisite. Many thinly seeded fields show bare spots, which are so much loss in land. If these spots constitute a third of a six acre field, then two acres are wasted. It has been found by careful counting that a foot square of rich old pasture, composed of mixed grasses, contains about a thousand plants; and some highly enriched and irrigated meadows have contained nearly twice that number. This is 7 to 12 plants to

a square inch. Now, let us see how much of the different grass seeds will give this number of plants. There are in a bushel of clear seed, of

Timothy,	40,000,000 seeds.	Meadow Fescue, 25,000,000 seeds.
Orchard grass, .	7,000,000 seeds.	Red clover, . . .
June grass, . . .	45,000,000 seeds.	White clover, . .
Red-top,	70,000,000 seeds.	

There are about 6,000,000 square inches to an acre; and allowing for one-third not growing, there ought to be 10 seeds to a square inch, or 60,000,000 per acre. It will be seen that this would require nearly a bushel of Red-top, and more than a bushel of June grass or Timothy. There are some grasses occupying more room; for example, a good sod of Meadow Fox-tail, six years old, was found to have but 80 plants to the foot, or less than one to each square inch; there are 6,000,000 seeds of this grass to a bushel; consequently about two-thirds of a bushel would seed an acre, if all grew. Clover plants occupy as much space, and a peck to half a bushel is a good seeding.

The preceding table will show the proportions of each to take, in forming a mixture of several sorts.

The writer of this article has tried thick seeding to great advantage; from half a bushel to a bushel of mixed timothy and clover having nearly doubled the crop from ordinary quantities, and rendered it finer and softer. The coarse and harsh character of hay from new meadows would be avoided by heavy seeding.

Depth of Burying. Much seed is lost by want of moisture and no covering, and much by burying too deep with the harrow. By careful experiments it appears that most of the common species of grass grow best when covered not over one-fourth of an inch deep; at a depth of about three-fourths to one inch only one-half grows; and nearly all kinds, including red clover, fail when buried two or three inches. The character of the soil would make much difference; for example, seed might be buried nearly twice as deep on light sandy as on strong loams. Seed sown on smooth mellow ground, and rolled, will generally be covered from a quarter to half an inch, and will succeed well if not followed by drouth. On light and thin soils, a fine harrow, made of many large cut nails, driven through plank, sloping backwards, will do good service. Nothing is better to make seed "catch," and start the young grass speedily, than a top dressing of rotted manure or fine compost, just before seeding.

Old and New Seed. Grass seed two or three years old is comparatively worthless; yet there is no ready way to detect it. The temptation in dealers to mix old with new, is no doubt sometimes great. The best way to test it, is to sprinkle the seed evenly and thinly between folds of cloth, and keep these constantly wet, but not soaked, and in a warm place, for a few days. If all or nearly all sprout, the seed is evidently of the best quality; if they are plump and only half germinate, it will lead to suspicion of mixture. In this case, twice the usual quantity should be sown.

A mixture of different species, always produces more grass, especially in pastures, than only one or two sorts. The smaller fill the interstices among the larger; the roots descend to different depths, and enrich the soil more equally by the supply of dense turf.

Time and Manner of Seeding. The most common practice is to seed to grass with some grain crop. The only advantage of this is the saving of labor by sowing two crops at one plowing. The disadvantage is the shading and retarding of the grass by the overgrowth of the grain. All crops dry up the soil, by the leaves pumping up the water through the stems and scattering it to the winds. Hence, after the first germinating process, while the earth is yet wet in spring, the grain crop is detrimental. It requires more labor, but is enough better to repay it, to prepare the land late in fall, and sow grass very early in spring, with nothing else. If well seeded on a rich soil, the young plants will quickly spring up, and soon be out of the reach of drouth. It will make a good crop the first year. If not sown quite early it will be likely to fail. Or, for any hardy grasses, an equally good and perhaps better time is early in autumn, after a grain crop has been harvested from the land. If the autumn is moist, it will make a good growth before winter, and bring a heavy crop next year.

Top-dressing with manure or compost in autumn greatly improves all grass land, the soluble parts of the manure wash into the soil and enrich it—it protects the roots from cold winds and exposure—and serves as a mulch the succeeding summer. The product of grass fields has been doubled by repeated top-dressings.

Irrigation, where it can be practiced, is always advantageous. Flooding grass lands with muddy water early in spring, by passing swollen streams over freshly plowed loam, has greatly increased the crop. It effects a fine, even mulching of the plants, more perfectly than any other process can accomplish.

Feeding close in autumn, exposes the roots to cold winds, which checks their early growth in spring, while a good coating of grass serves as an excellent protection, and favors an early and abundant crop. Pastures or meadows which have been closely fed, will be greatly improved and saved by a top-dressing of litter or of compost, applied in autumn.

Time of Cutting Grass for Hay. Early in its growth, grass is watery; as it approaches blossoming, the amount of sweet nourishing juice increases; after blossoming, and as the seed ripens, the sugar diminishes, and the hard woody fibre increases. The best time, therefore, generally is to cut within a few days after the principal portion of the crop has appeared in flower. For milch cows it should be cut a little earlier than for working oxen and horses. Hard stemmed grasses, as Orchard grass and Timothy, should be cut earlier than softer sorts.

Expense of Making Hay. When meadows were cut by scythes, and raked by hand-rakes, the cost of securing the crop was computed to be one-

half its value. Now, by the use of mowing machines, horse-rakes, horse-forks, &c., it need not be one-fourth, as the following estimate for cutting fifty acres will show :

Interest on \$100. cost of Mowing Machine,.....	\$7 00
Wear and tear, annually, say.....	3 00
Team and man, 8 days, 6 acres per day, (a low estimate,)	20 00
Cost of cutting 50 acres,.....	\$30 00
Raking, horse and man, 20 acres a day,.....	5 00
Drawing, if 2 tons per acre, 2 men and 1 team ; with horse-fork, 8 tons daily, \$3 per day, 12 days,.....	36 00
Contingencies, rain, &c, say.....	7 00
Cost of securing 100 tons,	\$78 00

Or, 78 cents per ton. It will be observed, however, that the team of the farmer stands idle much of the time in harvest, and that the actual cost, as compared

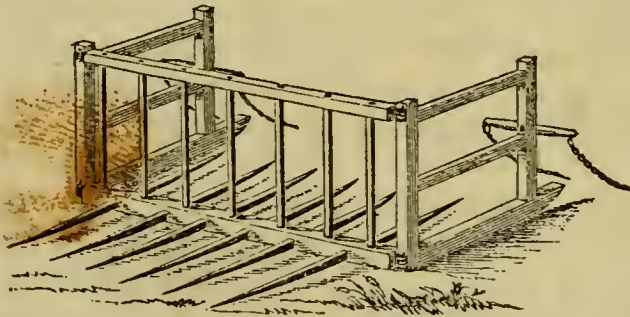


Fig. 12—HAY SWEEP.

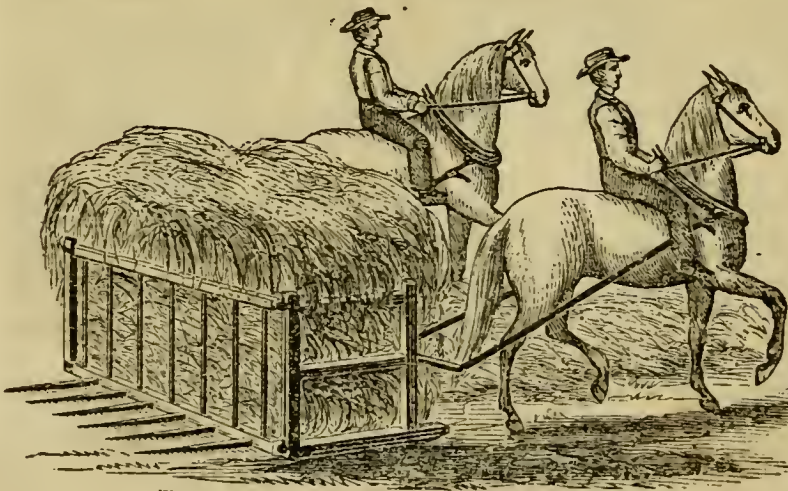


Fig. 13—HAY SWEEP IN OPERATION.

with the old way, would therefore be really less. Where the hay is secured in stacks or in hay-barns situated contiguous to the meadow, the use of the hay-sweep in connection with the horse-fork, would probably enable two or three men and two boys, with three horses, to draw and pack away *thirty tons a day or more.*

The hay-sweep is but little known.—The accompanying figures (12 and 13) exhibit its construction and use. It is essentially a large, stout, coarse rake, with teeth projecting both ways, like those of a common revolver ; a horse is attached to each end, and a boy rides

each horse. A horse passes along each side of the winrow, and they thus drag this rake after them, scooping up the hay as they go. When 500 pounds or so are collected, they draw it at once to the stack or barn, and the horses turning about at each end, causing the gates to make half a circle, draw the teeth backwards from the heap of hay, and go empty for another load—the

teeth on opposite sides being thus used alternately. To pitch easily, the back of each load must be left so as to be pitched first.

The dimensions should be about as follows:—Main scantling below, 4 by 5 inches, 10 feet long; the one above it, same length, 3 by 4 inches; these are three feet apart, connected by 7 upright bars, 1 by 2 inches, and 3 feet long. The teeth are flat, $1\frac{1}{2}$ by 4 inches, 5 feet long, or projecting $2\frac{1}{2}$ feet each way—they are made tapering to the ends, so as to run easily under the winnow. A gate, swinging half way round on very stout hinges, is attached to each end of this rake, and to these gates the horses are attached. They consist each of two pieces of scantling, 3 inches square and 3 feet long, united by two bars of wood 1 by 2 inches, and a third at the bottom 3 inches square, and tapering upwards like a sled-runner—these runners project a few inches beyond the gate. The whiffle-trees are fastened a little above the middle of the gate, and should be raised or lowered so as to be exactly adjusted. It may be made for \$5.

In using this machine, not a moment is lost in loading or unloading. No person is needed in attendance, except the two small boys that ride the horses. If the horses walk three miles an hour, and travel a quarter of a mile for each load, they will draw 12 loads, or three tons an hour, or 30 tons in 10 hours, leaving the men wholly occupied in raising the hay from the ground when deposited by means of another horse with the pitchfork.

It will be obvious that this rapid mode of securing hay will enable the farmer to elude showers and storms, which might otherwise prove a great damage.

The horse-pitchfork is figured and particularly described in a former number of the REGISTER.

HOW TO PUT UP A LIGHTNING ROD.

HAVING been repeatedly requested to give practical directions on this subject, we present a few brief instructions, illustrated with figures. In order that every one may know what is essential to success, we give in the first place a few rules or necessary requisites.

ESSENTIALS.

1. The rod must extend several feet at bottom into moist earth.
2. It must be connected throughout—not essentially in one piece, but if more than one, they must be in contact.
3. It must be sharp at top, and if there are several points, to divide any discharge, all the better.
4. It must be half as high above the top of the building, as the distance horizontally to the most remote part of the top.

5. It should be large enough to carry off any discharge without danger of being melted or broken.

NON-ESSENTIALS.

1. It is needless to keep the point bright, provided it is sharp. Hence, gilding or tinning, although giving a handsome finish, is little or no better than a point of iron, filed bright and sharp, which cannot hold moisture, nor become dull by rusting, in many years.

2. Insulators, made of iron staples or sockets holding rings of glass or horn, are of no value; as a slight charge from an electric machine will leap across such a small insulation; and when wet in any shower the glass conducts freely. A good, continuous rod, running into moist earth, will carry down the electricity, no matter what supports it—the fluid always takes the best conductor, if a continuous circuit is found. Wooden supports are cheapest, as good as any, and better than many others.

MATERIALS.

For general purposes, iron is best; copper is a better conductor, but the cost of this metal is as much greater than iron, as its increased value. At the same time, iron is stiffer, and will withstand the wind. As iron becomes slowly oxidised by water, it would be better to construct that part which passes into the earth of copper, which moisture alone does not rust. Iron rod, one-half or five-eighths of an inch in diameter, is large enough. Smaller rod has been melted by a discharge of lightning, but this size is safe.

CONNECTIONS.

The simplest and best way to fasten the several rods together, to make one whole, is to weld the ends. This is done by a common blacksmith, passing the rod thus made through the opposite doors of his shop. It is then dragged home by tying to a wagon. Where the building is very high, it may be difficult to erect the rod in one piece; in which case the connections may be made by screwing the two ends into a nut, as in fig. 1; or the ends may be spliced and screwed together, as in fig. 2, but this is less strong or firm. The points are made by welding to one end half a dozen smaller rods, (say $\frac{3}{8}$ inch diameter and 6 inches long,) after having sharpened them, and then bending them outward. Fig. 3 shows these points as welded on, and fig. 4 the same spread out. If filed sharp, like needles, they will remain so as long as the rod stands, but it gives them a handsomer appearance to tin them.

LENGTH AND HEIGHT.

The rule for the height above the building is this:—A rod in the center will protect a space whose diameter is four times the height of the rod above the building. If, for example, a building is 40 feet long, a rod in the middle 10 feet above the roof, will be a sufficient protection (fig. 5); but if at one

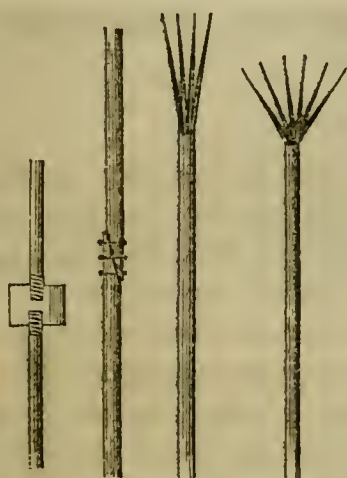


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

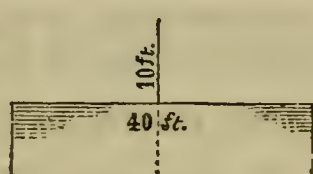


Fig. 5.

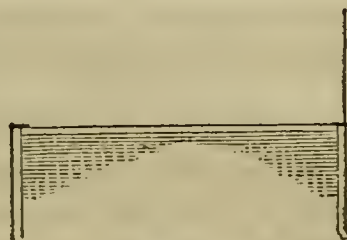


Fig. 6.

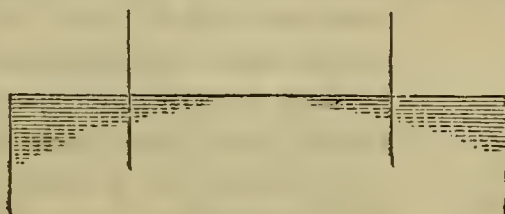


Fig. 7.



Fig. 8.

end, it must be 20 feet above (fig. 6). A barn 80 feet long, must either have a rod in the middle 20 feet high, or one at each end 20 feet high; or, if two are placed each 20 feet from the ends (fig. 7) they need be but 10 feet high, because each protects a circle of 40 feet diameter. Every rod should enter the ground to a depth of at least six feet. Add the height of the building to this depth, and to the height above it, and we shall have the required length; but if the rod is placed in the centre, the height of the building must be determined, not by measuring it perpendicularly, but along up the slope of the roof.

SUPPORTS

Wood is the best and cheapest. The only requisite is to hold the rod firmly. Usually a short bar, securely nailed to the building, with an auger hole at the outer end for the rod to pass through, is all-sufficient. Such a support is represented by fig. 8. The upper support on a chimney may be a light square wooden frame, *a*, fig. 9, nailed together, and accurately fitting the chimney outside, one of the rods forming the frame projecting a foot, through which a hole is bored to receive the rod. A carpenter will make such a frame in half an hour. At the foot of the chimney, a piece of plank with a hole through the upper edge, as shown by fig. 10, is nailed on the roof, so as to keep the rod about six inches from it. One or more like this may be placed between the chimney and eaves, to keep the rod above the

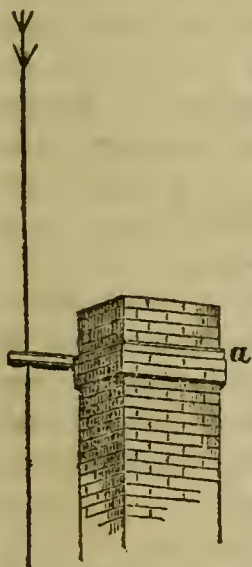


Fig. 9.



Fig. 10.

roof. At the eaves, a very simple fastening is made, consisting merely of a piece of board, with a hole through the outer end, nailed on the roof, or still better beneath the eaves, and projecting a few inches.

In all these instances, it is obvious that the lower end of the rod must be thrust through these supports before they are nailed to the building, and

before the rod is elevated, and both must go up together. Three or four hands may be needed to do this work for a tall house.

STIFFENERS ABOVE THE ROOF.

Where there is no chimney or other projection above the roof, for a support, a short stiff wooden point should be placed where the rod is to be erected. This wooden piece may be set perpendicularly into the timbers,

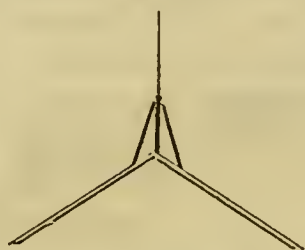


Fig. 11.

when the roof is made, and firmly secured in its position. But when this has not or cannot be done, a four-legged bracing may be attached to the ridge of the roof as shown in fig. 11, the legs being made of small strips of board an inch by an inch or two, and three to five feet high, according to the height of the rod above.

They are nailed to the roof, and to a small block at the top, with a hole for the rod.

In order to stiffen that part of the rod above the roof, it should be largest at the roof, and taper upwards, which is easily effected by welding three or four rods of different sizes together at their ends, the lower one being about an inch in diameter, the next above three-fourths, the third five-eighths, and the upper one-half an inch.



Fig. 12.

ENTERING THE EARTH.

The most important and most frequently neglected requisite, is a sufficient depth for the rod below. If it enters but a short distance, the earth may become dry in summer, and thus being a poor conductor, the rod may do more harm than good, by inviting the fluid but not discharging it. Houses having rods, have been torn to pieces in consequence of this deficiency. *The rod should enter permanently moist earth.* This is sufficient. It is not commonly found less than five or six feet deep. To assist in the discharge and dissipation of the fluid, place a bushel (more or less) of charcoal in the bottom of the hole, into which the rod may enter. Charcoal is an excellent conductor, and will scatter the lightning into the earth. As the iron rod which enters the soil may in many years become rusted through, it is safest to use copper for this part; either a copper tube, the size of the rod, or several narrow copper straps riveted on a few inches above the ground, and spreading off in different directions below.

THE COPPER ROD.

The objection to the use of a copper rod, is its increased cost and want of stiffness. But a perfect copper conductor may be made by erecting a pole for its support. This pole may be a few feet from the building, and rising a sufficient height above it, according to the rule already given. A copper strap, nailed to this post, serves as the conductor. It would be best if in one

piece, coiled, and unrolled as nailed on. The upper end may extend a foot or so above the pole, and be sheared into sharp points, as in fig. 12. The lower end enters the earth six or seven feet, and has a bed of charcoal about it. An objection to this kind of conductor is the cost of erecting the pole, and its liability to decay and fall in a few years. This objection is removed by securing it to the building itself, and to a stiff rod of sufficient height above it, erected when the building is made.

VARIOUS ERRORS.

Very few inventors of patent rods understand fully the principles of electricity, and most of them fall into serious errors. One has been already mentioned, namely, insulating iron staples, with small glass or horn rings, which the smallest charge of a machine would pass. Another is the alledged necessity for silver, or platinum, or palladium points. Iron, if sharpened like a needle, will always remain so, as it cannot retain a drop of water nor rust. Another is, twisting together many wires, copper or iron, or both, claiming that this gives more surface, according to the well known principle that the fluid remains in the surface. The error consists in supposing that



Fig. 13.

the fluid exists on inner surfaces, or sunk faces. Make a conducting body in the form shown by fig. 13, or with various depressions; insulate and electrify it. Apply the *trial planes* which electricians use, to the depressions, and they will be found to contain no electricity at

all. It is only the outer parts of a conductor that hold the fluid. Hence the inner surfaces of the wire conductors are of no value.

Another error is, the assertion that painting an iron rod makes it a non-conductor. Those who make the assertion never tried the experiment. Trial shows it to be perfectly groundless.

Another error is, in making angular rods, on the supposition that the angles will draw the fluid. They discharge it as readily as they drew it; and hence, if a heavy charge should come down from the clouds, they would tend to throw it into the building from the angles, if there were any impediment below. We admit, however, that when all the connections are perfect, these angles would be neither useful nor detrimental.

COST OF RODS.

We give a single bill of cost, of two rods erected on barns last year by the writer. One barn was 54 feet long—the rod was placed in the middle, and extended 15 feet above the roof—total length of rod, 55 feet. The other barn was 38 feet long, the rod also in the middle, extending 11 feet above, and total length 49 feet. Round iron rod was used, five-eighths of an inch in diameter, except the lower portion above the roof, which was partly an inch, partly three-fourths, and so tapering upwards. The rods were stiffened as shown in fig. 11. The following was the entire cost of both rods:—

Cost of 103 feet rod,	\$3.68
Blacksmith work, welding, setting on points, &c.,	1.50
Tinning the points,	25
Digging the holes,	50
Charcoal,	20
Carpenter, erecting.....	87
Total cost,	\$7.00

If an itinerant erector had been employed, he would have probably bristled these buildings with various points, at a cost of some twenty or thirty dollars, at doubtful value or permanency.

“BALLOON FRAMES.”

By GEO. E. WOODWARD, ARCHITECT AND CIVIL ENGINEER, NO. 29 BROADWAY, NEW-YORK.

[WRITTEN FOR THE ANNUAL REGISTER OF RURAL AFFAIRS.]

Illustrated, from Original Drawings by the Author, made from Practical Examples.

“If it had not been for the knowledge of balloon frames, Chicago and San Francisco could never have arisen as they did, from little villages, to great cities in a single year.”—SOLON ROBINSON.

IN these days of BALLOONING, it is gratifying to know that there is one practically useful, well tested principle, which has risen above the character of an experiment, and is destined to hold an elevated position in the opinions of the masses. That principle is the one which is technically, as well as sarcastically, termed Balloon Framing, as applied to the construction of all classes of wooden buildings.

The early history of the Balloon Frame is somewhat obscure, there being no well authenticated statements of its origin. It may, however, be traced back to the early settlement of our prairie countries, where it was impossible to obtain heavy timber and skillful mechanics, and the fact is patent to any one who has passed through the pleasures and the vicissitudes of the life of a pioneer, that his own necessities have indicated the adoption of some principle in construction, that, with the materials he has at hand, shall fulfill all the necessary conditions of comfort, strength and protection. To these circumstances we must award the early conception of this frame, which, with subsequent additions and improvements, has led to its universal adoption for buildings of every class throughout the States and cities of the west, and on the Pacific coast.

The Balloon Frame has for more than twenty years been before the building public. Its success, adaptability, and practicability, have been fully demonstrated. Its simple, effective and economical manner of construction, has very materially aided the rapid settlement of the West, and placed the art of building, to a great extent, within the control of the pioneer. That necessity, which must do without the aid of the mechanic or the knowledge of

his skill, has developed a principle in construction that has sufficient merit to warrant its use by all who wish to erect in a cheap and substantial manner any class of wooden buildings.

Like all successful improvements, which thrive on their own merits, the Balloon Frame has passed through and survived the theory, ridicule and abuse of all who have seen fit to attack it, and may be reckoned among the prominent inventions of the present generation, an invention neither fostered nor developed by any hope of great rewards, but which plainly and boldly acknowledges its origin in necessity.

The increasing value of lumber and labor, must turn the attention of men of moderate means to those successful plans which have demonstrated economy in both, and at the same time preserved the full qualities of strength and security so generally accorded to the old foggy principles of framing, and which, we presume to say, is inferior in all the true requisites of cheap and substantial building. Light sticks, uninjured by cutting mortices or tenons, a close basket-like manner of construction, short bearings, a continuous support for each piece of timber from foundation to rafter, and embracing and taking advantage of the practical fact, that the tensile and compressible strength of pine lumber is equal to one-fifth of that of wrought iron, constitute improvements introduced with this frame.

If, in erecting a building, we can so use our materials that every strain

will come in the direction of the fibre of some portion of the wood work, we can make inch boards answer a better purpose than foot square beams, and this application of materials is one reason of the strength of Balloon Frames.

The Balloon Frame belongs to no one person; nobody claims it as an invention, and yet in the art of construction it is one of the most sensible improvements that has ever been made.

That which has hitherto called out a whole neighborhood, and required a vast expenditure of labor, time, and noise,

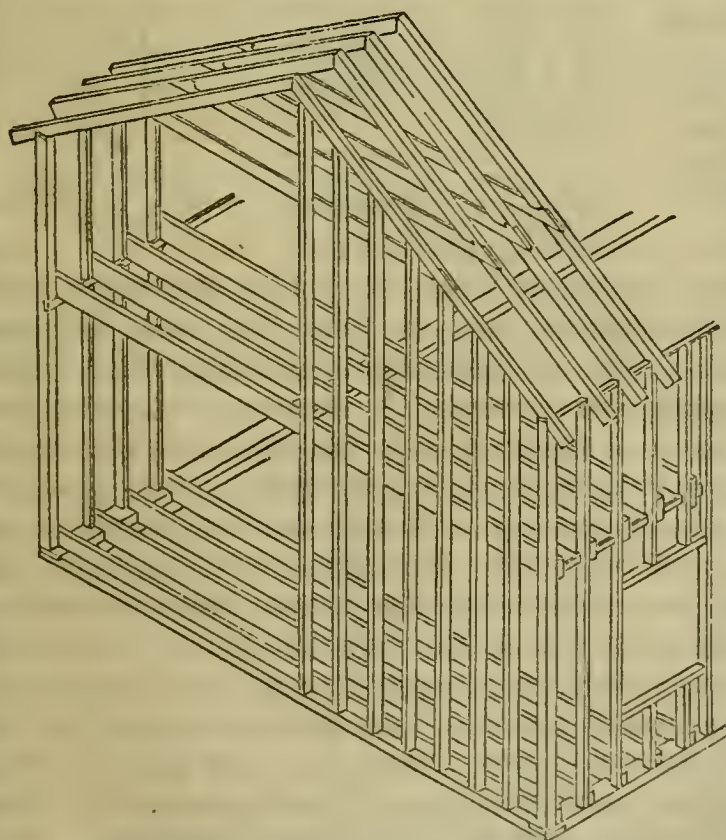


Fig. 1—ISOMETRICAL PERSPECTIVE VIEW OF THE BALLOON FRAME.

can, by the adoption of the balloon frame, be done with all the quietness and security of an ordinary day's work. A man and boy can now attain the same results, with ease, that twenty men could on an old fashioned frame.

The name of "Basket Frame" would convey a better impression, but the name "Balloon" has long ago outlived the derision which suggested it.

The moment the foundation is prepared, and the bill of lumber on the ground, the balloon frame is ready to raise, and a man and boy can do all of it. The sills are generally 3 inches by 8 inches, halved at the ends or corners, and nailed together with large nails. Having laid the sills upon the foundation, the next thing in order is to put up the studding. Use 4 by 4 studs for corners and door posts, or spike two 2 by 4 studs together, stand them up, set them plumb, and with stay laths secure them in position. Set up the intermediate studs, which are 2 by 4 inches, and 16 inches between centres, toe or nail them diagonally to the sill. Then put in the floor joists for first floor, each joist to be placed alongside each stud, and nailed to it and to the sill. Next measure the height to ceiling, and with a chalk line mark it

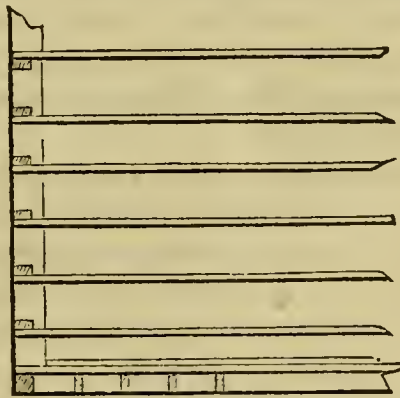


Fig. 2—FLOOR PLAN.

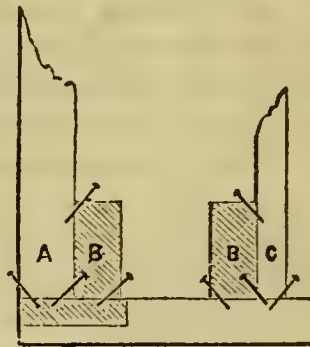


Fig. 3—ELEVATION SECTION—manner of nailing.—A. corner stud, 4 by 4—B. joist, 5 by 3—C. 2 by 4.

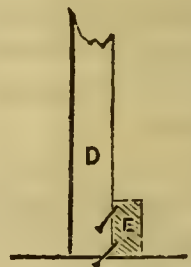


Fig. 4—UPPER EDGE OF JOIST—E. Stud.

around the entire range of studding; below the ceiling line notch each stud one inch deep and four inches wide, and into this, flush with the inside face of the studding, nail an inch strip four inches wide. This notch may be cut before putting up the studs. If the frame be lined on the inside, it will not be necessary to notch the strip into the studs, but simply to nail it to the studding; the object of notching the studding is to present a flush surface for lathing, as well as to form a shoulder or bearing necessary to sustain the second floor; both of these are accomplished by lining inside the studding—(for small barns and out-buildings that do not require plastering, nail the strip 4 by 1, to the studding)—on this rests the joists of the second floor, the ends of which come flush to the outside face of the studding, and both ends of each joist are securely nailed to each stud; the bearing of the joist on the inch strip below, it is close by the stud, and the inch strip rests on a shoulder or lower side of the notch cut to receive it. This bearing is so strong that the joists will break before it would yield. Having reached the top of the building, each stud is sawed off to an equal

height; if any are too short they are spliced by placing one on top of the other, and nailing a strip of inch board on both sides. The wall plate, 2 by 4 inches, is laid flat on top of the studding, and nailed to each stud; the rafters are then put on; they are notched, allowing the ends to project outside for cornice, &c. The bearing of each rafter comes directly over the top of each stud, and is nailed to it.

A Balloon Frame looks light, and its name was given in contempt by those old foggy mechanics who had been brought up to rob a stick of timber of all its strength and durability, by cutting it full of mortices, tenons, and auger holes, and then supposing it to be stronger than a far lighter stick, differently applied, and

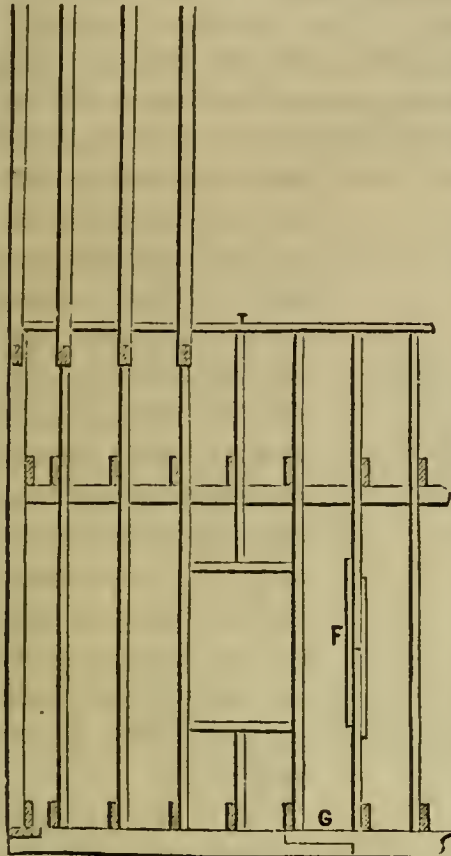


Fig. 5—SIDE ELEVATION.—G. Manner of splicing sills—F. Manner of splicing studs.

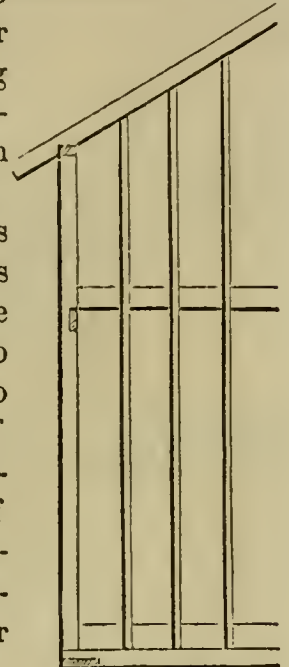


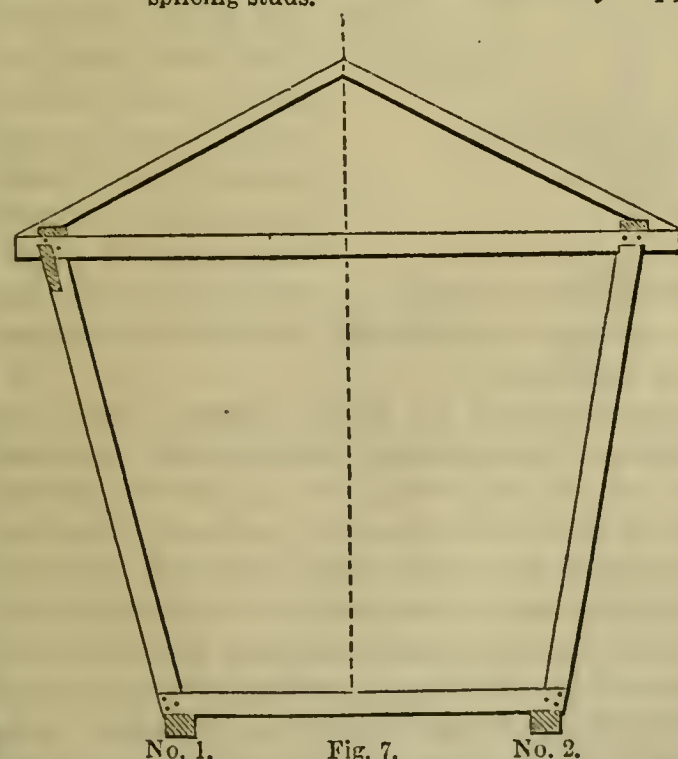
Fig. 6—END ELEVATION.

with all its capabilities unimpaired.

Properly constructed, and with timber adapted to its purposes, it will stand securely against the fury of the elements, and answer every purpose that an old fashioned timber frame is calculated to fulfil.

If the building is to be erected on piers, as is often done with barns and out-buildings, then the sills should be heavy, as shown in fig. 5.

Fig. 7 shows a half section of two modes of framing corn cribs. The lumber



or timber may range in size from 2 by 4 up, according to the capacity required.

ed—2 by 4 inch stuff, except for floor timbers and sills, is sufficiently large for the ordinary size of these buildings.

Where the building is supported on posts, heavy sills are necessary, and the frame should be securely nailed or spiked together. The bents may be 16, 24 or 30 inches apart, and covered in the usual manner. The thrust of

both the rafters and contents of the building are outward; the tie, 1 by 4, is abundantly strong, as each one will practically sustain in the direction of its fibre, three tons.—The floor joists are nailed to studs at each end. No one need fear any lack of perfect security, as these ties exceed in strength any hold that tenons could have.

Fig. 8 illustrates the manner of framing buildings of one story, such as are used about most every farm or country seat, as tool houses, granaries, wash houses, spring houses, &c., &c., and on southern plantations admirably adapted for the

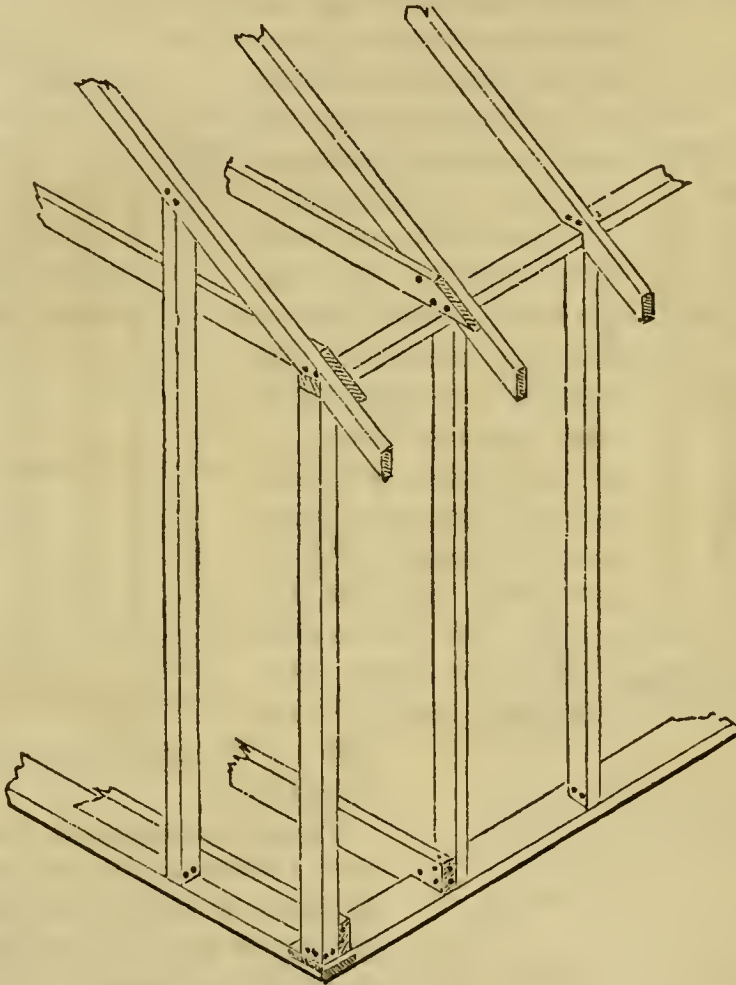


Fig. 8—ISOMETRICAL PERSPECTIVE BALLOON FRAME.

erection of negro cabins in a cheap and attractive style, adding much to their appearance and economizing in their cost.

Very small buildings, if unplastered, will not require ceiling joists; a tie at each end will be all-sufficient. Moderate size buildings will be strong enough if the ceiling joists are left out, and collars put on half way up the rise of the rafter. According to the size and uses of the building, the collars or ceiling joists may be put on every rafter, every other, or every third rafter; floor joists should be about 16 inches between centres, and the studding may be from 16 inches to 8 feet apart; in the last case only, every sixth floor joist is nailed to the stud, the intermediate ones being arranged equally distant from each other between the studding. Where the studding is placed wide apart, the plate must necessarily be heavier to sustain the roof; if vertical

siding be used it should be nailed to the sill and plate, and to an intermediate horizontal strip spiked in between the studding; if done in this way the plate may be lighter; when horizontal siding is used, the studding should not be more than 4 feet apart—in small buildings, say 12 by 20 feet, we should cut all our stuff, except joists, from $1\frac{1}{4}$ inch plank. Studs four inches wide, rafters 5 inches wide; floor joist should be 2 by 9 inches, and put all up 30 inches between centres.

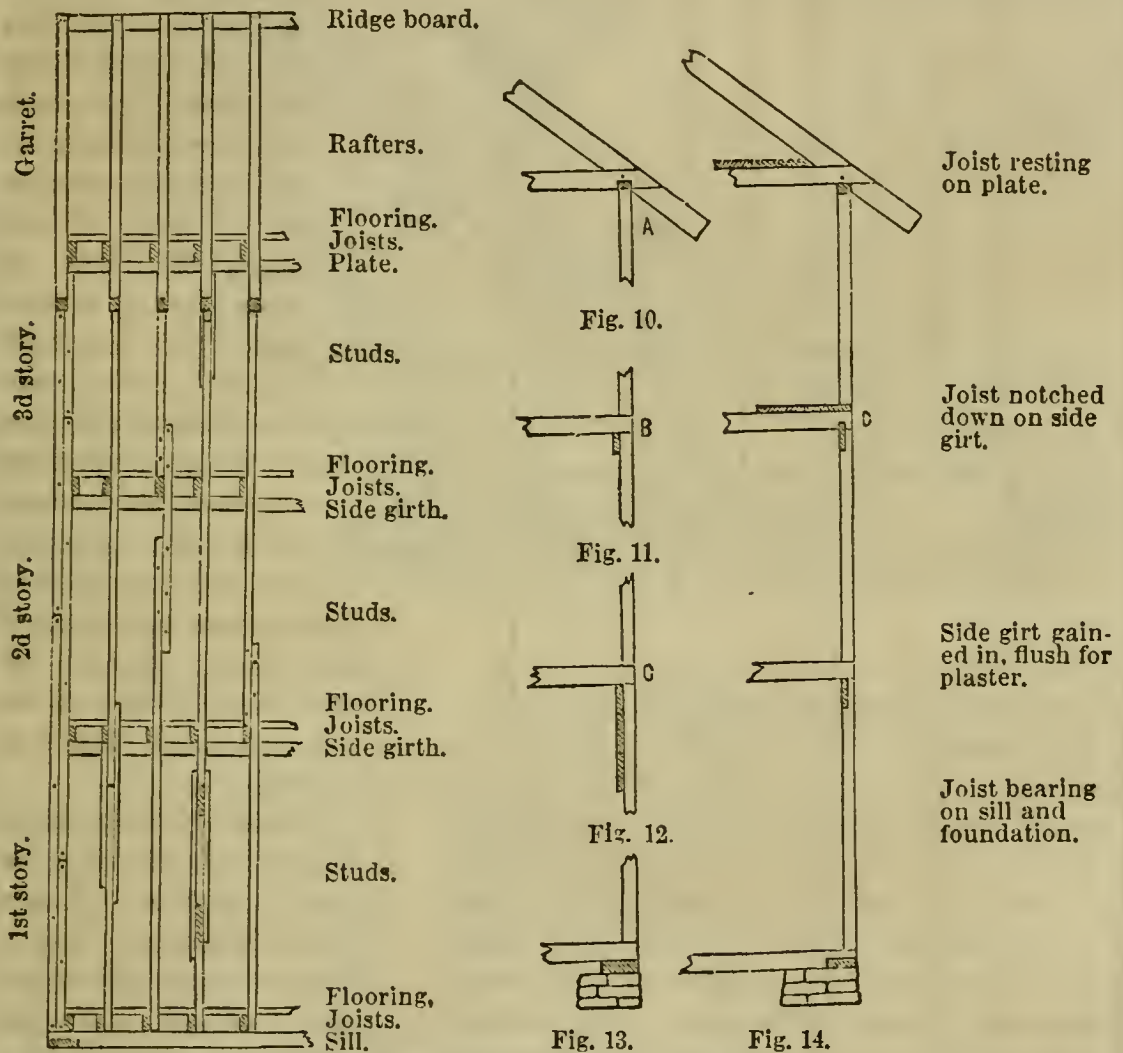


Fig. 9—THREE STORY BUILDING. BALLOON FRAMING. DETAILS.

Fig. 10. Joist notched down on plate. Fig. 11. Side girt not gained in for small unplastered buildings. Fig. 12. Inside lining—answers the same purpose as a side girth. Fig. 13. Joist bearing on sill.

In fig. 9 is shown the manner of constructing frames for buildings of three stories. The corner stud, 4 by 4, is composed of and built up with two 2 by 4 studs, which are nailed together, breaking joints as the building progresses in height; the splicing of studs is done in the same manner, being nailed together as fast as additional length is required; the joists of the last floor are laid upon the plate, and they act as tie-beams to sustain the thrust of the rafters. We consider the splice where the studs butt and have side strips nailed to

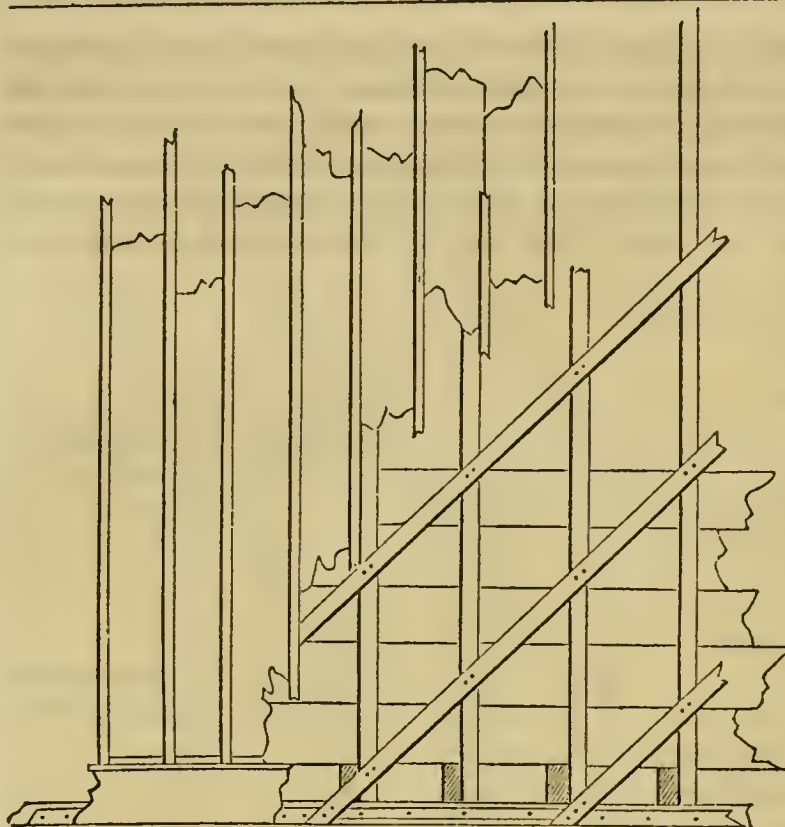


Fig. 15—DIAGONAL RIBS FOR VERTICAL OR BATTENED SIDING.

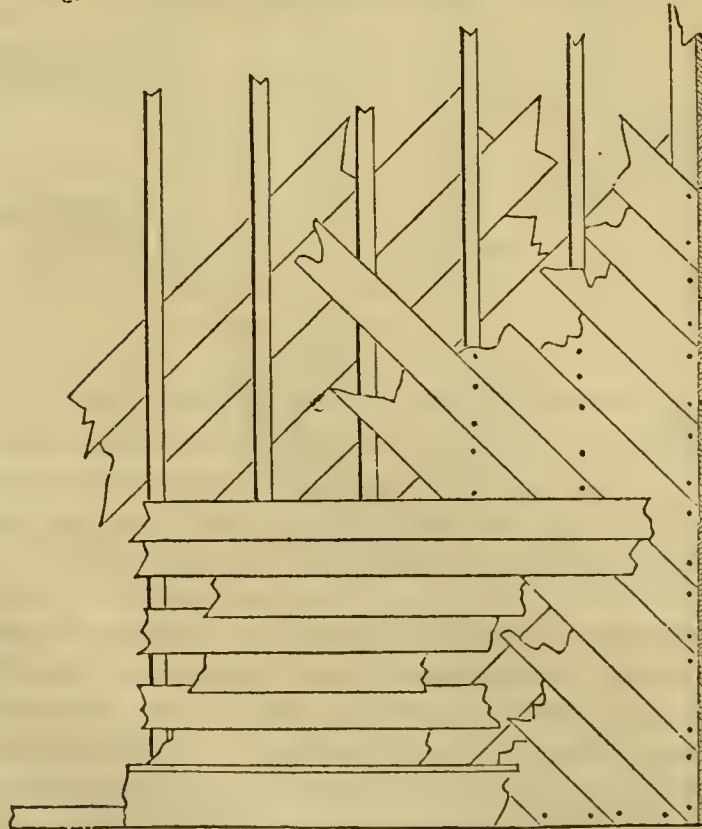


Fig. 16—Showing the manner of Putting on Diagonal Lining Outside and Inside. Siding may be Horizontal or Vertical.

them, to be the most secure; the lapping splice is very generally used, however, and found to answer every purpose.

Ribs for vertical siding may be put on in two ways; one as shown, by which the ribs run over the sill and are nailed to it; a strip of the same thickness as ribs, say $1\frac{1}{4}$ inches, nailed on to the sill to fill up the space between the ribs, and is then covered by the outside plinth or base. The other plan

is to set the studs back $1\frac{1}{4}$ inches from face edge of sill; then let the end of ribs bevel down on the sill, or dovetail them into the edge.

Either outside or inside lining may be used, or both together. Where diagonal lining is used it should be reversed or run the other way on the opposite side of the house.

Where a frame is lined inside it is best to do it as shown in fig. 17, as it becomes an additional tie to the corners of the frame, it being alternately lapped on the corner stud.

The lining of a Balloon Frame adds immensely to its strength, particularly

so if put on diagonally; it may be done outside or inside, though on the whole the inside is preferable. If done outside, it should be carried over the sill and nailed to it; the sill being wider than the studding, in order to get a larger bearing on the masonry, and the floor joists being in the way,

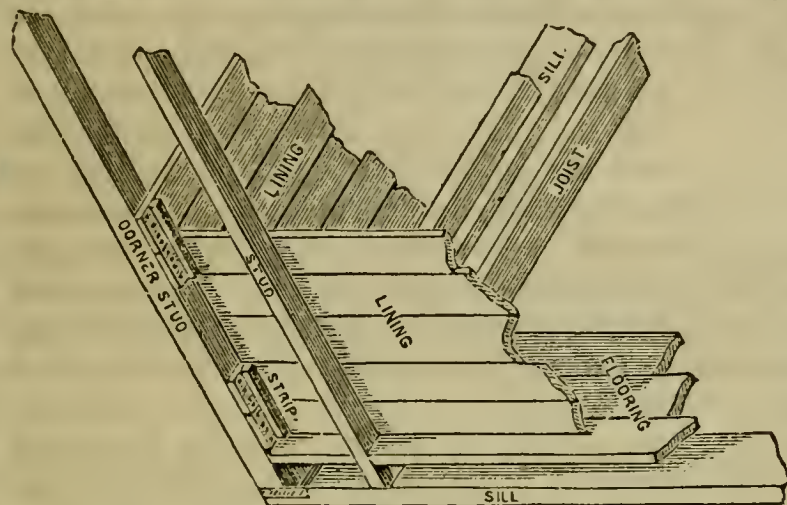


Fig. 17—MANNER OF LINING BALLOON FRAMES INSIDE.

does not admit of inside lining being put on in the same manner. A first class Balloon Frame should be lined, if for vertical siding, outside the studding—if horizontal siding is used, line inside; it makes the frame stiffer and the building warmer.—Some line diagonally, say from centre next the first floor towards extreme upper corners both ways; others line one side diagonally in one direction, and the other in an opposite direction. This makes assurance of strength doubly sure. If lined inside, nail perpendicular lath to the lining 16 inches from centres, and on this lath horizontally for plastering.

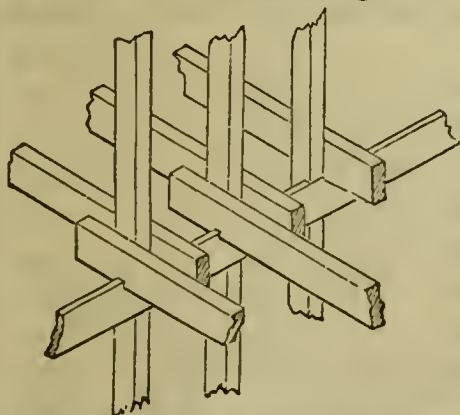


Fig. 18—MANNER OF FRAMING PARTITIONS THAT RUN TWO OR MORE STORIES.

In the construction of Balloon Frame houses, the studs for those partitions that run through the building are not cut separately for each floor, as in the old mode of framing, but are preserved entire, or spliced when required, in the same manner as the outside frame. The studs pass between the joists of each floor, which rest upon a girt 1 by 4 inches, let into the studs. The joists are locked over this girt, by cutting an inch notch on the under side, and lap each other from 8 inches to 1 foot, as shown in fig. 18.

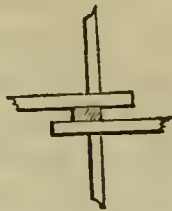
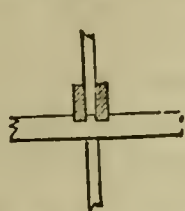
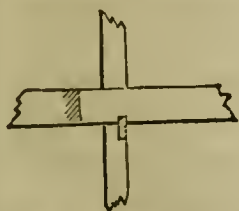


Fig. 19—SIDE VIEW. Fig. 20—END VIEW. Fig. 21—PLAN.
Showing Manner of Framing Partitions.

The flooring, when laid, is nailed to all the joists, and each joist should be brought close up alongside the stud.

the manner of doing the work. The side girts on the partition studding

Figs. 19, 20 and 21 are the side view, end view, and plan of joists, showing

should be put on an inch higher than the side girts on the outside frame, unless both ends of the floor joists are notched, to be locked over the girts.

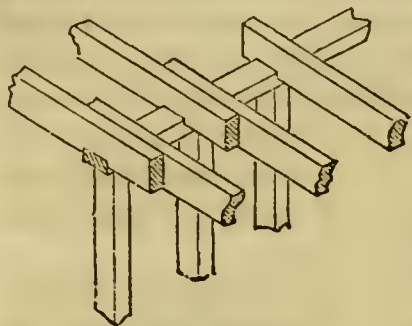


Fig. 22.

Showing manner of framing partitions that run only one story.

Fig. 22 shows the manner of arranging joists over a partition that does not run above one story, or that which has no partition over it on the next floor. This is like the old mode, except that the joists are notched and locked over the plate. The object of lapping and locking joists, is to make them a continuous tie from one side of the building to the other, and when the flooring is nailed on, they are practically as strong as if they were in one solid piece. This prevents bulging, and the joists of all frames, whether Balloon or otherwise, should be arranged in this manner.

It will be observed, on looking again at fig. 18, that there are three continuous ties, in three different directions—thus, up and down, lengthwise and crosswise, and that *every joint* in the frame, whether outside or inside, has each of these three different conditions of strength. This applies to the naked frame. After the flooring is laid, and the outside boarding on, the building becomes so knit together, laced and interlaced, that it is as one entire piece.

The principle of Balloon Framing is the true one for strength, as well as for economy. If a mechanic is employed, the Balloon frame can be put up for *forty per cent. less money* than the tenon and mortice frame. If you erect a balloon frame yourself, which you can easily do without the aid of a mechanic, it costs the price of the materials and whatever value you put upon your own time.

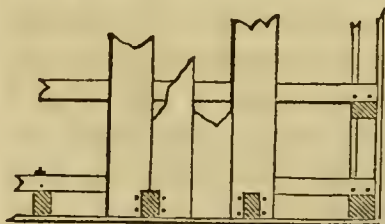


Fig. 23.

Showing lengthwise and crosswise manner of tying frame.

Fig. 23 shows the manner of attaching the flooring to gable end studding and in those buildings in which the thrust of the rafters is in the direction of the flooring—if every third stud be bolted to the joist in the manner shown, it makes the tie equal if not superior to that in the direction of the joists.

Fig. 24 explains the manner of framing the largest class of barns. Wide openings, like bays, require the use of heavy timber, and the

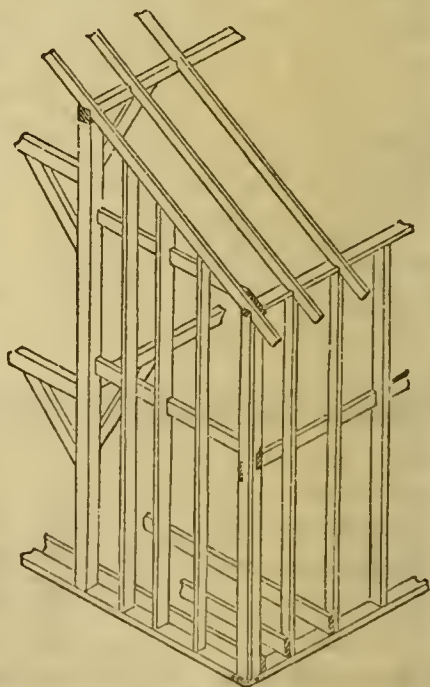


Fig. 24.

Manner of Framing Large Barns.

mortice, tenon and brace, only so far as the gallows frame is concerned; the balance of the frame is of light stuff, studding 2 feet to $2\frac{1}{2}$ feet apart, 2 by 6 inches, every third one 2 by 8 inches, into which is gained the side girt, it being nailed to the others. On this rests one end of the temporary floors, the gallows frame supports the roof, and the rafters are secured to it, so that they become ties. The side of this building is like a floor turned on edge, and is firmly secured by the floor joists at the bottom and the rafters at the top.

Warehouses, depots, and other buildings of a very large size, can be made stronger by using the Balloon Frame, instead of the heavy timber frame. Those who prefer to err on the right side, can get unnecessary strength by using deeper studding, placing them closer together, putting in one or more rows of bridging, and as many diagonal ribs as they like. In large buildings there is no saving in timber, only the substitution of small sizes for large—the great saving is in the labor, which is quite important.

The following are some of the advantages claimed for the Balloon Frame:

1. The whole labor of framing is dispensed with.
2. It is a far cheaper frame to raise.
3. It is stronger and more durable than any other frame.
4. Any stick can be removed, and another put in its place, without disturbing the strength of those remaining—in fact, the whole building can be renewed, stick by stick.
5. It is adapted to every style of building, and better adapted for all irregular forms.
6. It is forty per cent. cheaper than any other known style of frame.
7. It embraces strength, security, comfort, and economy, and can be put up without the aid of a mechanic.

MOVABLE COMB BEE HIVES.

[WRITTEN FOR THE ILLUSTRATED ANNUAL REGISTER, BY M. QUINBY.]

If a clock had stopped, and was so constructed that we could not get at the interior to see the difficulty, without spoiling it, we would be in about the same predicament that we are with a colony of bees in the old box hive, not in running order, and which wants repairs in some little wheel, axle or cord. The clock runs, if properly made and set up, until something interferes with its operation, or some weak part gives out. So with bees, an ordinary swarm put into a hive works regularly until some part of our artificial arrangements are out of order and wanting repairs. Now we have a hive, like the clock, that can be taken in pieces, every part examined, the evil found and remedied, and the parts united together and again put in motion. After hundreds

of worthless patents inflicted on bee-keepers, we have at last an improvement. There is no longer need of *guessing* about the interior. It is unnecessary to wait a post mortem examination, or to depend on a diagnosis from outside appearances. If your hive is queenless, the fact can be at once known and remedied, without waiting till it is ruinously reduced to ascertain. Should the queen produce nothing but drones, the discovery is early made. She can be readily looked up and removed, and her place supplied with a more profitable incumbent. If the bees have made, as they often do, an unprofitable amount of drone comb, it may be removed and its place supplied with worker comb instead. When the moth worm has effected a lodgment in the combs, they are readily taken out, and he is successfully attacked in his strongholds.

If the apiarian wishes to limit the number of his swarms to one from each hive, he can, a few days after the first has issued, take out the combs, remove all the queen cells but one, and prevent all after swarming. When one hive has a surplus of stores and another is deficient, it only requires an exchange of a comb or two, which is readily made, to equalize and benefit both. When combs get old and need renewing, the cells being reduced in size, it is only necessary to substitute empty frames in place of the full ones to effect it.

For making artificial swarms, and rearing queens artificially, I know of no other hive with facilities equal to this. And now, the introduction of the Italian bee into this country, makes some form of the movable combs almost indispensable to all who intend propagating this variety. Very likely, after having purchased and introduced a queen into a colony of native bees, curiosity would induce an examination the next day, to see that all is safe. A very few moments would suffice to obtain the assurance, with this hive, while with the box it would be necessary to wait several days for brood to appear, or drive out the bees—a slow, tedious process—and look her up.

The movable comb hive proper was not obtained with the first effort, but is the result of successive steps or degrees. The first attempt was long since made by different apiarians of Europe, and a few in this country. The first form was simply a series of cross-bars at the top, the ends resting on rabbeting, to

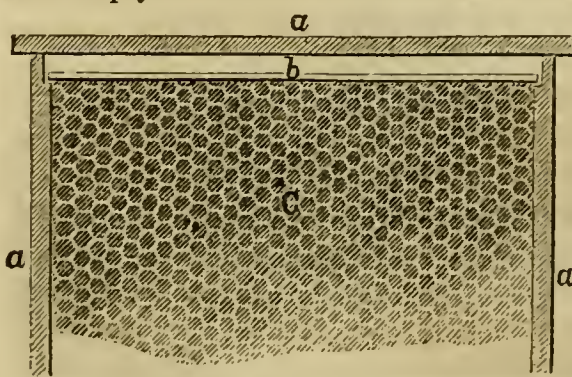


Fig. 1.

a. a. a. Hive. b. Bar. c. Comb, attached to hive.

support the combs instead of being attached to the board top. (Fig. 1.) Guide combs were attached to these bars, in order to have the bees work them straight. Access to the interior of the hive was had by taking off one of its sides. The combs were removed in succession by detaching with a knife the edges where they were joined to the hive. (The bees, during these operations, are quieted with smoke blown

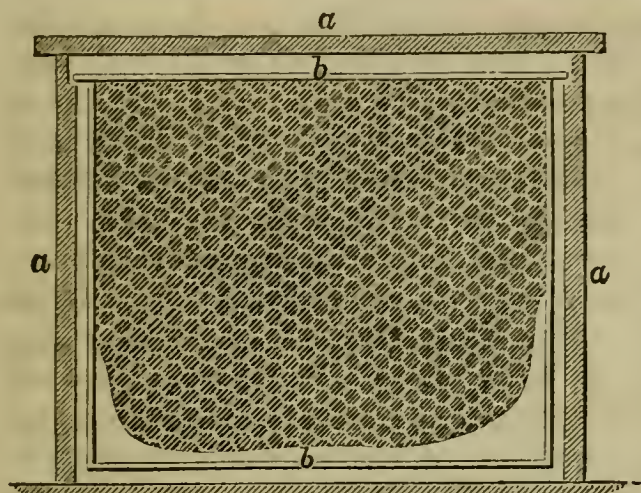


Fig. 2—a. a. a. Hive—b. b. Frame.

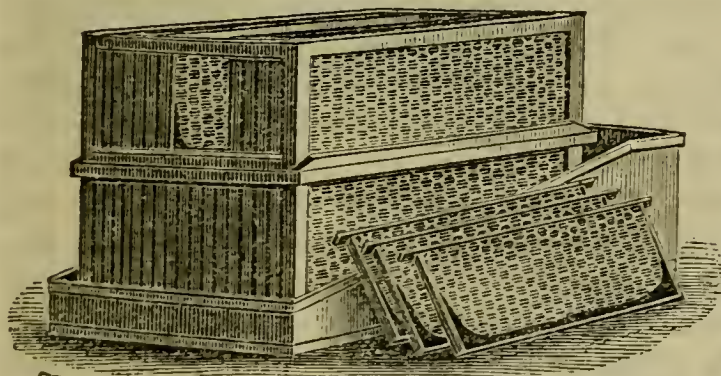
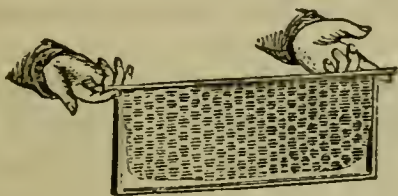


Fig. 3—MOVABLE FRAMES TAKEN OUT.

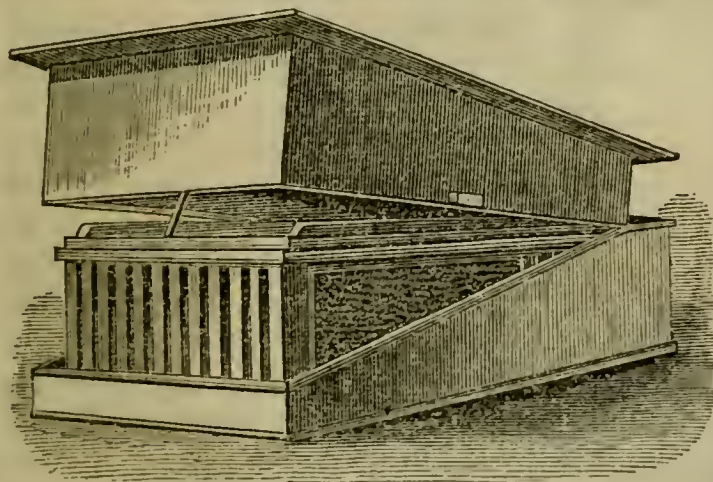


Fig. 4—LANGSTROTH'S HIVE.

among them, or sprinkling them with water sweetened with su_ar.)

The next step was an addition to the cross-bar, of a frame to surround the comb, the edges of which are attached to the two vertical pieces that pass down inside the hive, but not touching it, instead of the sides of the hive. (Fig. 2.)

As this frame is supported by the rabbeting at each upper corner, it can be taken out without difficulty; but as all the combs had to be removed before access could be had to the last one, it was found too tedious an operation for general adoption.

To the Rev. L. L. Langstroth belongs the merit of introducing to the American public a hive accessible to these frames, by opening the top. Patented in 1852. Any comb, properly made, could be selected and removed at pleasure. (Fig. 3.)

He has several forms to his hives, all made on this principle. The one figured here is the usual mode. (Fig. 4.) It is made double; the inside, or hive proper, is of glass on three sides. The top movable, on which are placed the surplus boxes, and to be removed whenever the frames are taken out. The whole is inclosed in a case

connected with all other parts; bottom fast to the hive, cover to boxes connected by hinges, &c.

In some respects this, having all fast together, is a convenience; it can be taken up and put down anywhere; it is always complete; and yet it sadly interferes with many operations. When the hive is separate from the bottom, and can be raised, we can clean off the filth from the floor easily; the strength of the colony is readily ascertained by looking at the bottom of the combs, and the presence of the moth worm is often first indicated by the appearances on the bottom board. These little things need looking to many times in the course of the summer, and are quite sure to be neglected—by some bee-keepers at least—if the combs are to be lifted out before an examination can be made. But the movable comb hive need not necessarily be fastened to the bottom. There are many forms of movable combs, beside those given by Mr. Langstroth. One made according to the following directions, will combine all the essential qualities of those costing much more. It has been used to some extent, and those who are satisfied with a plain, simple hive, will hardly be able to do better with any other one of its class.

The boards to construct it should be $12\frac{1}{2}$ inches wide, and one inch in thickness; cut two lengths, two pieces $21\frac{1}{2}$ inches and two 12 inches long; the shorter pieces are rabbeted out on the inside upper edge a half inch square, to receive and support the ends of the frames. The pieces are now thoroughly nailed together, making a box without top or bottom, the inside just 12 by $19\frac{1}{2}$ inches square, and $12\frac{1}{2}$ deep. In one end is made an entrance 4 inches long by $\frac{1}{4}$ deep at the bottom, and an inch hole for another, half way to the top. A strip of wood, $\frac{3}{4}$ inch thick by 2 inches wide and 14 long, is nailed across each end at the top as handles. If desired, these handles may be mouldings, with more added to the sides, to make a better finish. The frames for the inside consist of five pieces: one, triangular, 1 inch wide, 18 inches long; one, $20\frac{1}{2}$ inches long, $1\frac{1}{8}$ wide, and $\frac{1}{4}$ inch in thickness. The second is nailed to the first, having each end of the longest project $1\frac{1}{8}$ inches

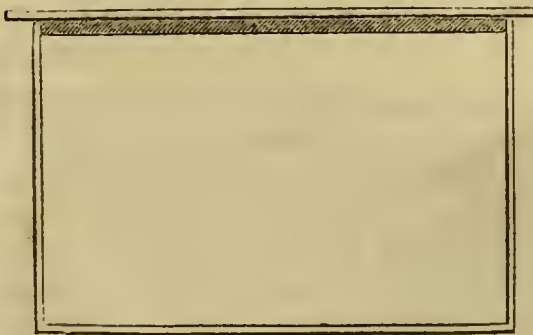


Fig. 5.

beyond the other. Two pieces for the ends, 11 inches long, $\frac{7}{8}$ inch wide by $\frac{1}{4}$ in thickness. For the bottom, a piece $\frac{7}{8}$ wide by $\frac{3}{8}$ thick and 18 in. long, to correspond with the triangular one at the top. Drive the nails through the short strips. When together we have a frame in this shape, 18 inches long by 10 deep, inside.

Fig. 5.

This will go down into the hive and leave a space between the end of the frame and end of the hive. The strip that is nailed to the triangular one will rest on the rabbeting and support it, touching no other part of the hive, (as seen in fig. 5.) Eight of these will be needed in a hive 12 inches wide—

$1\frac{1}{2}$ inches being the right distance from center to center. To keep them the right distance apart at the bottom, a small strip $\frac{3}{8}$ by $\frac{1}{4}$ inch square is put across the middle of the hive, $\frac{3}{8}$ inch from the bottom, with wire braces in this form (fig. 6.) Two small mortices, $\frac{1}{4}$ inch deep, on each side, will



Fig. 6.

hold it. It may be put in after the hive is together, by bending it a little. Very small annealed wire will answer. Cut it in pieces, long enough to reach through and turn over to the upper side, which will hold them firmly. The points or angles should be just $1\frac{1}{2}$ inches apart, and correspond with the spaces between the frames at the top.

The top can be made of whole boards, but it is apt to warp, even when clamped, and is much better when constructed of several pieces, thus: Two pieces are cut $21\frac{1}{2}$ inches long by $1\frac{1}{2}$ wide, the others 11 long; two of the latter, 6 inches, and two $4\frac{1}{2}$ wide. The nails are driven through the long

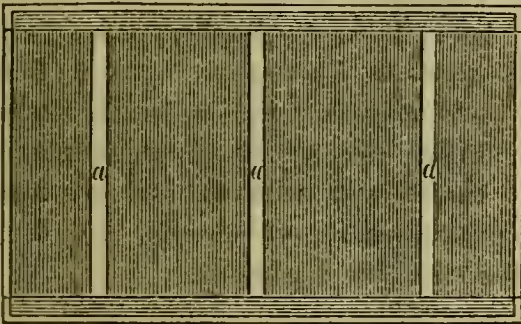


Fig. 7.

narrow strips edgewise into the ends of the boards. Around the edge is a rabbeting half an inch in depth and width.

The open spaces, *a. a. a.* (fig. 7,) are passages for the bees into the surplus boxes, which set on the spaces with corresponding openings in the bottom of the boxes. These boxes may be the same as for any other hive. To pro-

tect them and shut out the light, a close fitting cover or cap is necessary, six or eight inches deep, and large enough square to fit the rabbeting in the edge of the board. The top of this cover may receive a molding or be left plain—this is a matter of taste.

The large surface at the top gives room for a greater number of surplus boxes than many other hives, which occasionally is quite important. The frames being long a less number will suffice, and as a long one can be made as quickly as a short one, there is some gain in making. Other advantages of this shape, in relation to the winter stores, are not mentioned.

The smooth whole combs that are made in frames, without passages through them, are not as well adapted to wintering bees in the open air as the old box hive with cross sticks, on the under side of which the bees usually leave an opening.* To remedy this, there seems to be no better way than to take out the combs at the approach of cold weather, and cut out a hole near the center of each. Any contrivance dividing the frame with bars in which was made a passage permanently, does not operate so well. Even the long frames, when divided, have not proved satisfactory. Another difficulty with all these

* These remarks apply to all movable comb hives.

hives, is to always get straight combs. The bees follow an angle when sawed smoothly, much better than when roughly done, yet with all possible pains some of the combs will be made crooked, and those that are straight will be unequal in thickness, making it difficult, and sometimes impossible, to raise out the frame. The guide comb, when to be had, should be used. To obviate

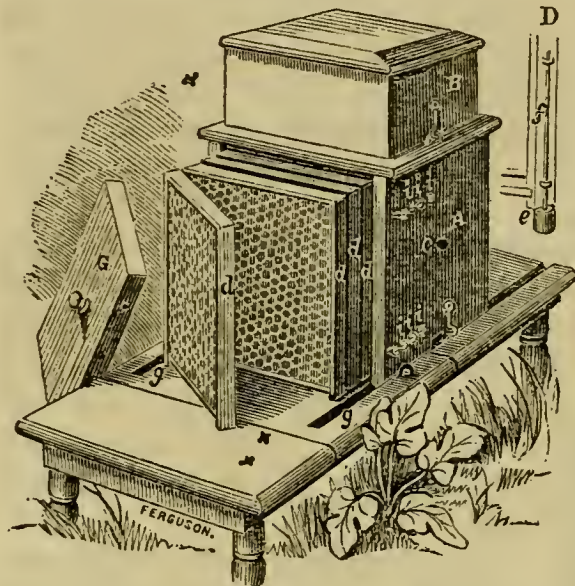


Fig. 8—UNDERHILL'S LEAF HIVE.*

out of straightness. A hive with these conveniences, of course, is a little more expensive to construct than the plain one just described.

There are still several other patent or movable frames, but as they involve no new or important principle, it will be unnecessary to describe further. None are, as yet, perfect. But any one of them, probably, with all its defects, is superior to the old box. A bee-keeper, well enough posted on the nature of the bee to take advantage of all the facilities that are offered by them, can hardly afford to do without some one of them.

* A. is the hive made in the usual manner, with the ordinary box, B., on the top, and proper holes, c. c., for the entrance of the bees. The frames, d. d. d. d., made in the manner described, are connected by a pivot to the table in the manner represented in D. A wooden pin, e., has inserted firmly into it the wire rod, f., which passes through staples in the frame, so that the frame may swing on the rod, as a door swings on its hinges. The hive, A., slides in the grooves, g. g., of the table, so that it may be pushed back from around the frames as shown in the cut. When it is desired to examine the interior of the hive, the box, A., is pushed away from the frames, when these may be turned gently outward on their hinges, so as to separate them from each other, and if one of them is found to be filled with honey, it may be removed without any damage to the comb, and its place supplied with an empty frame. A strip of tin a quarter of an inch in width projects vertically downward along the middle of the upper part of the frame, to induce the bees to make their comb in a straight line, a plan which was discovered by accident, and which is found to be perfectly successful in practice. The capacity of the hive inside may be adjusted to the size of the swarm by means of the movable slide, G. A series of holes are made, and stopped by the movable pins, i. i. i., and the slide, G., is pushed in as far as desired opposite any of these holes, when pins are inserted to hold it in place; the proper amount of frames, of course, being removed to make room for the admission of the adjustable slide. When the hive is closed, the box, A., is held in place by means of a hook and staple.

SUMMER PEARS—OLD AND NEW SORTS.

THE improvement of the pear, and dissemination of many new and excellent varieties, are marked features in the progress of pomology. Forty-three years ago, William Coxe described sixty-five sorts, in the best and most complete American work known at that time. Yet out of this number, only about four sorts are now regarded as worthy of cultivation, namely, the

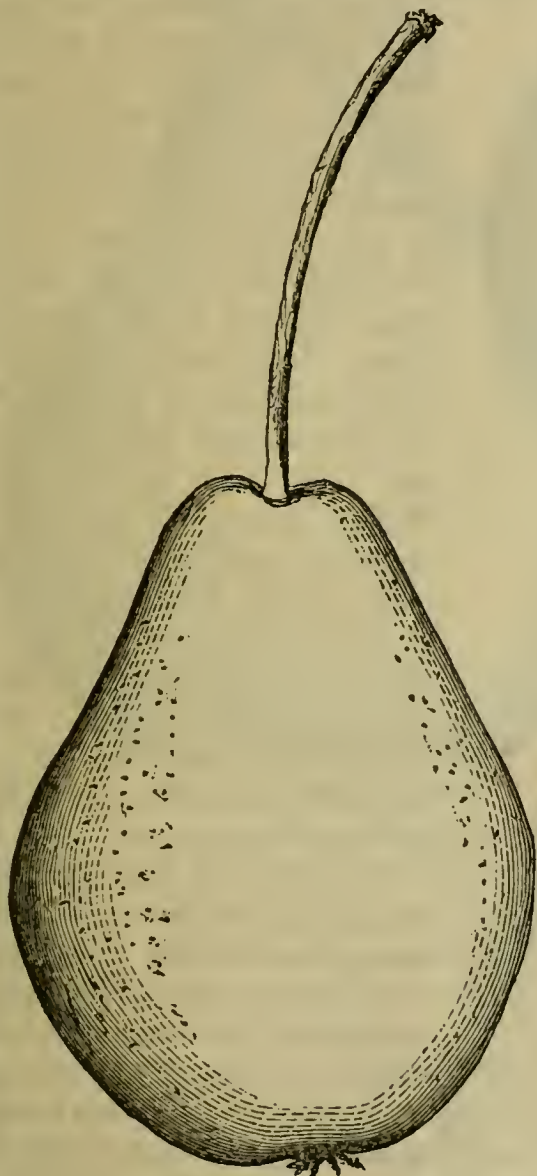


Fig. 1—SKINLESS.

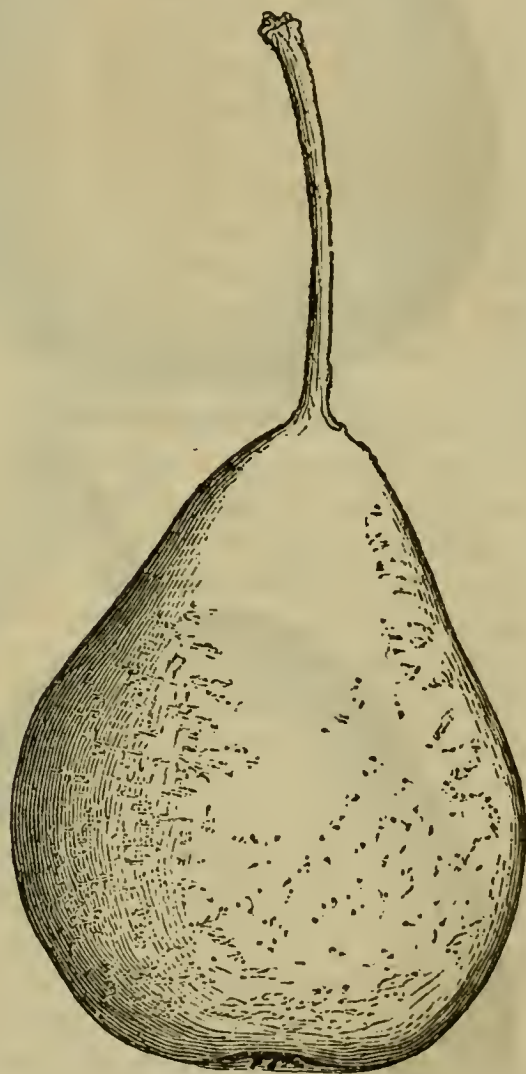


Fig. 2—ROSTIEZER.

Madeleine, Skinless, (fig. 1,) Seckel and Virgalieu or Doyenné. We have since added, equal to these as an average, the Summer Doyenné, Osband, Giffard, Brandywine, Tyson, Rostiezer, (fig. 2,) and Bloodgood, for summer; Bartlett, Ananas d' Eté, Kirtland, Washington, and others, for early autumn; for other autumn varieties we have such fine ones as Flemish Beauty, Anjou,

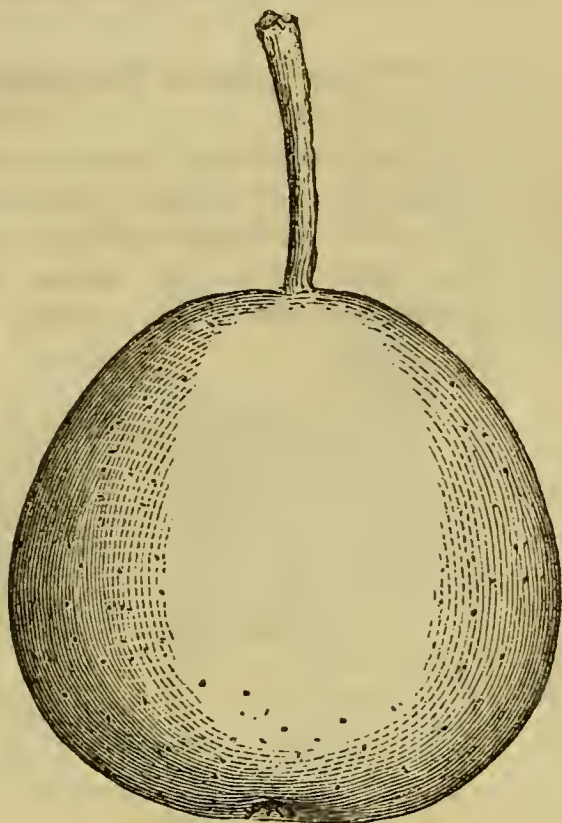


Fig. 3—DOYENNE D' ETE.

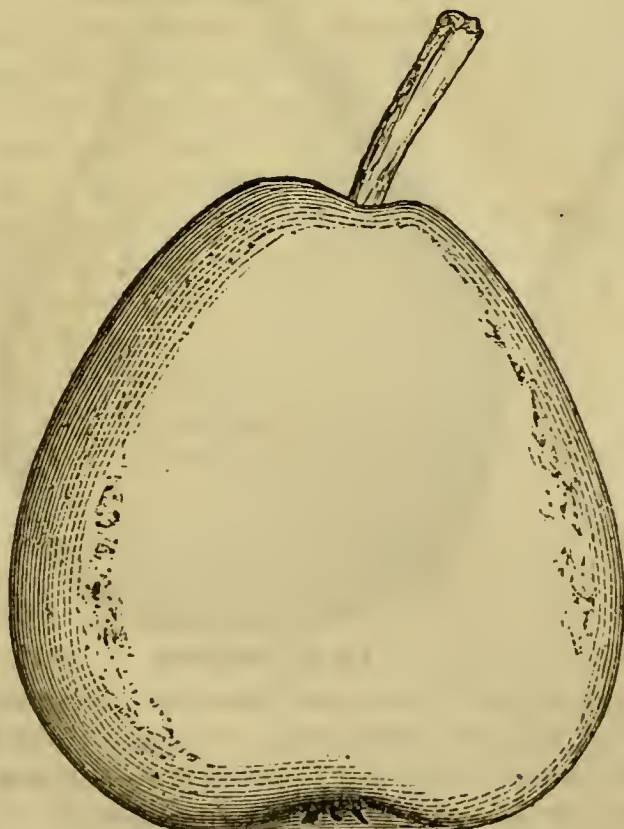


Fig. 4—OSBAND'S SUMMER.

Belle Lucrative, Bosc, Autumn Paradise, Nouveau Poiteau, Urbaniste, Louise Bonne of Jersey, Superfin, Sheldon, Lawrence, Buerré Hardy, and others. And yet nothing has been found equal to the Seckel for high flavor, nor to excel it for general hardiness; and for general value, where it is not liable to crack, no new sort scarcely equals the Virgalieu.

In order to assist our readers to make good selections, it is well to name not only good varieties, but those that have been rejected as of inferior value. Some think they have "the best pears in the world," till they see and know of better. We have had the old French Jargonelle sent hundreds of miles, as a new and valuable sort, "very superior," because the honest cultivator was not familiar with our delicious early varieties; and the Summer Bell and Bonchretien are still sometimes eagerly asked for of nurserymen.

The very best early pears—ripening at the same period—and about the time that farmers usually begin to cut their wheat, are the *Madeleine*, an old sort, and *Summer Doyenne* (Doyenné d' Ete, fig. 3,) a new one. Each sort has its admirers. Some have pronounced the *Madeleine* the best; it is larger and more melting, while the slight grain of acidity makes it very agreeable as a summer fruit. But it is not so

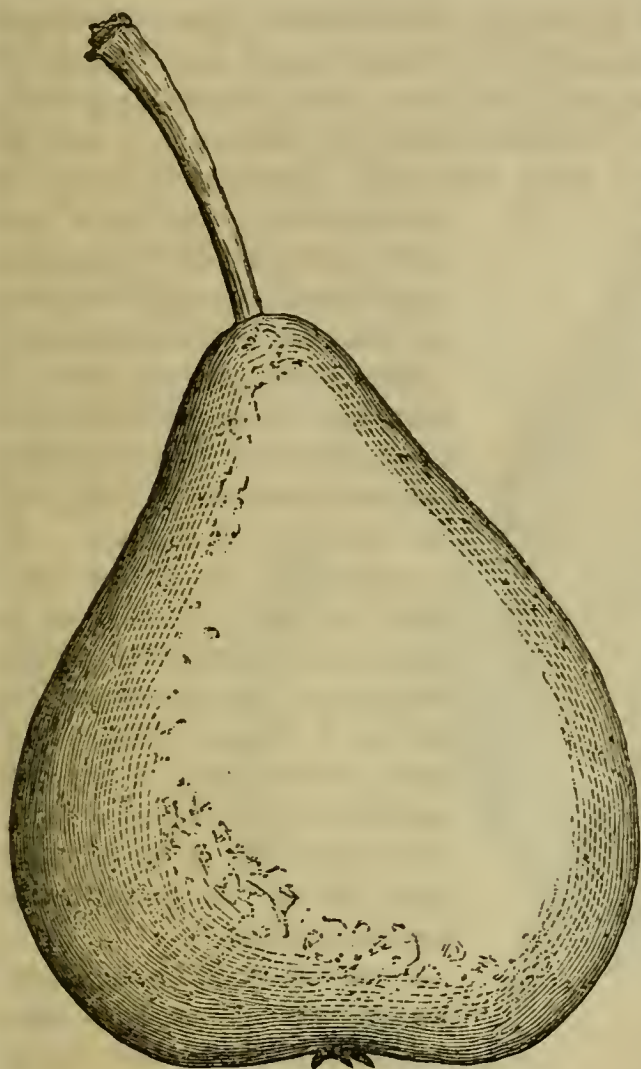


Fig. 5—BEURRE GIFFARD.

newer sorts. It is remarkable for its handsome and free growth, and for growing well in different soils—probably no pear thrives so well as this on such as are light or sandy—for its great productiveness, and for the uniform quality of the fruit. It has almost a glossy smoothness, and a very thin skin; whence its name. If it were a new sort, “far brought and dear bought,” it would have many admirers.

The *Beurre Giffard*, (fig. 5,) would stand at the head of summer pears, (next preceding in maturity the Rostiezer and Tyson,) if it was a free grower. It is almost as bad in this respect as the Nelis among later varieties. The growth is slender, crooked, and feeble. The peculiar purplish shoots, and the long slender leaf-stalks, enable the cultivator to recognize it very readily among all other sorts. The pear itself is of very high quality—rich, juicy, melting, and perfumed. It is of full medium size, and the tree a good bearer. Notwithstanding its poor growth, it must stand as high as any kind of its season, which is about the same as Osband’s Summer and Bloodgood, or a little later.

productive as the Summer Doyenné, the tree is not so hardy, and is more subject to fire blight; while the Summer Doyenné, although less juicy, has undoubtedly the highest flavor. On the whole, the votes preponderate in favor of the latter.

Osband’s Summer, (fig. 4,) ripens a week or two later than the preceding, and is valuable for the hardiness and fine growth of the tree, its even bearing, and the fair appearance and good quality of the fruit—although not of the highest flavor. *Bloodgood* ripens nearly the same time, is about the same size as the Osband, is often superior to it in flavor, but sometimes falls below, being somewhat variable; and the tree is slow in growth. Nearly or quite equal to Osband’s Summer, and a little later, is the *Sanspau* or *Skinless*, (fig. 1,) an old variety, whose merits have been too much eclipsed by

About the same season, there are several other summer pears, of various degrees of value:—*Dearborn's Seedling* is a rather small pear, mostly of high quality, but in some places of little value. It is a handsome grower, and an early and good bearer. Notwithstanding its smallness, it may be regarded as worthy of a place in large collections. The *Zoar Beauty*, a

native of Ohio, is a fruit of moderate flavor, but the fine growth and productiveness of the tree, and the handsome appearance of the fruit, render it worthy of attention. It grows freely as a dwarf, and the fruit on our trees has been three inches long, and two and a half in diameter. It is subject to rot at the core, which may be prevented, as in all other summer pears, by early picking and house-ripening. The *Limon*, a Belgian variety, is a small obovate fruit, buttery and melting in texture, and usually, not always, with a high "very good" flavor. It should be in large collections.

Immediately after the preceding, or near the close of summer, several fine pears ripen. Among these the *Rostiezer* (fig. 2) is undoubtedly the highest flavored. It holds the same rank among summer pears as the *Seckel* among those of autumn. Unlike the *Seckel*, however, it is a strong grower, and it makes a handsome and productive tree.

The fruit is a little below medi-

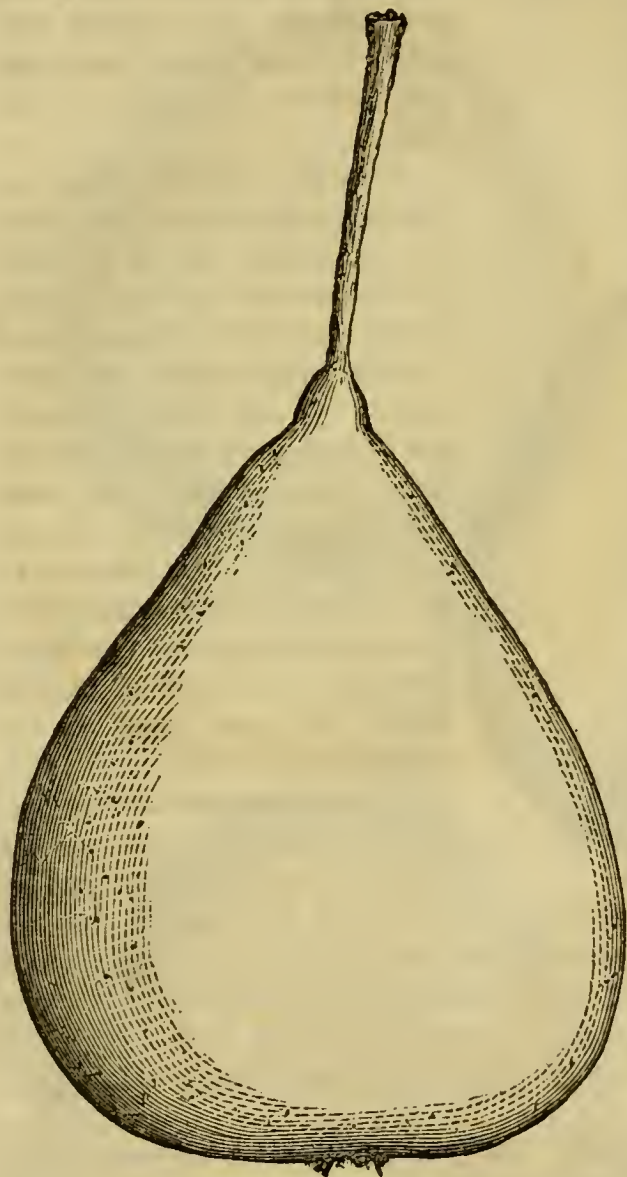


Fig. 6—TYSON.

um in size, juicy and melting, rich, sugary and perfumed. We have never heard any one object to its flavor. Equal in general value, but not quite so high flavored, is the handsome and excellent *Tyson*, (fig. 6.) It is a fine, upright grower, larger than the *Rostiezer*, and of uniformly good quality. It is a tardy bearer on pear stocks, although ultimately quite productive. As a dwarf, it bears early and profusely. The *Ott*, (fig. 7,) a new Pennsylvania pear, a seedling of the *Seckel*, is a rather small, and delicious late summer sort. The tree is a moderate grower. The figure which we give is drawn

from an unusually large specimen, grown on the grounds of Ellwanger & Barry, of Rochester. The *Pulsifer* (fig. 8) is an Illinois variety. The tree is an upright and vigorous grower; the pear about medium in size; it is melting and juicy, and if well ripened is "very good." The *Brandywine* is one of the best late summer pears, and originated in Delaware county, Pa. It

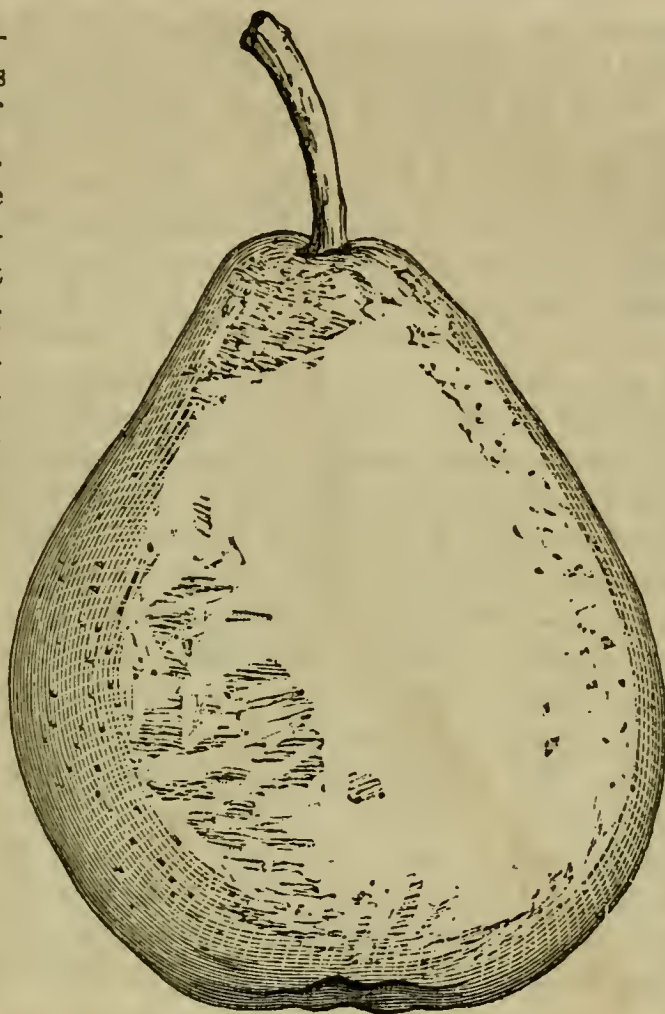


Fig. 8—PULSIFER.

is a vigorous and handsome grower, both on pear and quince. The fruit is full medium in size, but rather dull in appearance. Its quality is usually "very good," although sometimes inferior. *Manning's Elizabeth* is a beautiful and very good fruit, but too small to become a great general favorite. *Moyamensing*, of Philadelphia origin, is a vigorous and productive tree, with an irregular, obovate, rough or knobby fruit. It is "good," sometimes "very good," but must be taken at

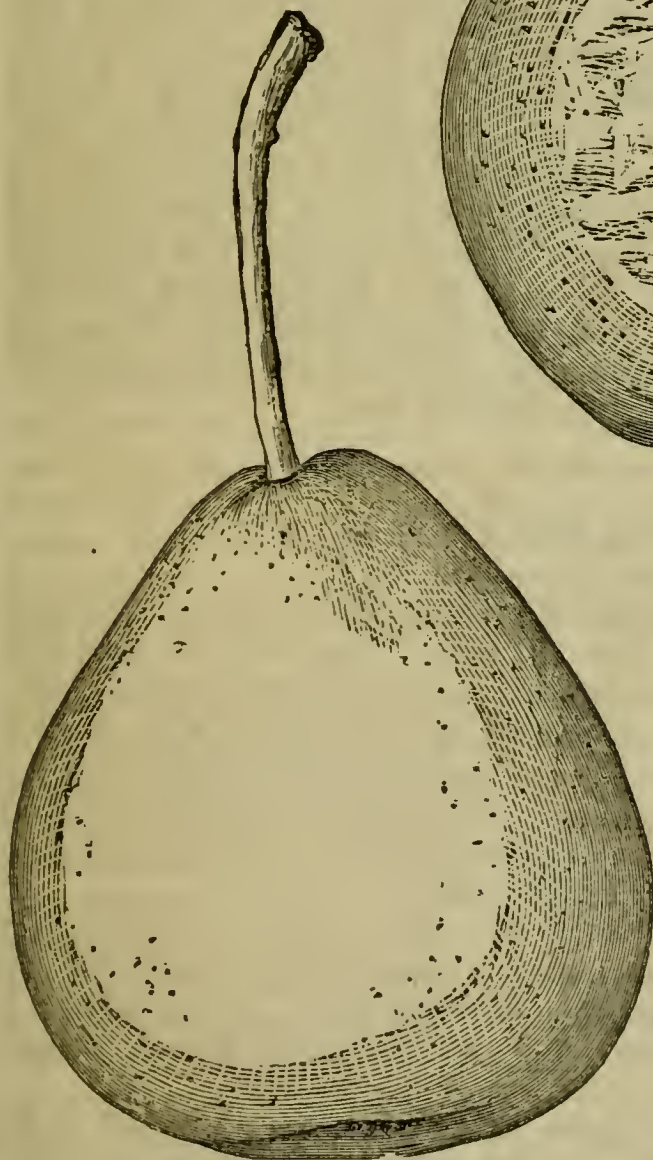


Fig. 7—OTT.

exactly the right time in ripening, or, as Dr. Brinckle, who introduced it, once remarked to us, "it should be eaten by the chronometer."

There are some old summer varieties, that may be worthy of a passing notice. *Amire Joannet* is the earliest known pear, ripening a week before the Madeleine; it is very small, rather handsome, and the tree a free, upright grower and early bearer. We consider it, however, as entirely unworthy of cultivation; for although sometimes tolerably good, it is more usually dry, mealy, poor, and worthless. The *Little Musk* or *Primitive*, is a week later, even smaller than the preceding, but a profuse bearer, and better in quality. It is but little or no earlier than the Madeleine and Summer Doyenné, and is therefore rejected. The *Muscat Robat* is larger, better, and later, but has not good qualities enough to render it worthy a place with the best sorts. The *Sugar-top* is about the size of the Madeleine and ripens with it, but the flavor is poor. It is admired, however, by those who never saw a good summer pear. The *Jargonelle*, one of the best of the old sorts, matures two weeks after these, and if picked early and house-ripened, so as to prevent the core-rotting to which it is so liable, is often of quite good quality; to some its agreeable acidity renders it a favorite. Nearly all persons would, however, greatly prefer the Bloodgood, Giffard and Osband, which are nearly as early. The *Julienne* was formerly highly prized, but is not now cultivated in the Northern States. In the South, it is greatly improved both in size and quality, and is one of the very best early pears for that region, ripening, along the borders of the Gulf of Mexico, before midsummer. No sort is equal to it for early bearing, nothing being more common than to see small trees in the nursery row bending under loads of fruit.

THE VALUE OF ORCHARDS.

THOSE who are about to prepare the ground and set out orchards, have mostly very indistinct views of their real value. They know that good fruit sells in market, but they have never made any defined estimate of the probable income from ten acres of well selected, well planted, and well cultivated trees. Whether there will be an annual return of a hundred, five hundred, or five thousand dollars, they have never carefully figured; and those who have made calculations have perhaps greatly erred as to the probable amount to be reasonably expected, for want of reliable data.

Apple orchards are the most certain and reliable, and their profits are very high. There is always an extensive market for good apples, because they are useful for every day food, and are within the reach of all. When more skill is generally acquired in picking and keeping, the market will increase, because there will be less loss by decay on the part of the purchaser.

Forty years ago, good winter apples sold for 25 cents per bushel at the orchard; and it is remarkable that notwithstanding the millions of trees which

have since that time been set out, and the changes which have passed over the country and its people, the price has not at any time greatly varied from this sum. During scarce seasons it has been higher; and when the crop has been abundant, market has not been found for all; but even in the latter instance, selected fruit, from thrifty, well managed orchards, would always command a ready price, and at higher rates than the average, by special contract. Rare or fancy sorts, (as Northern Spy, Lady Apple, &c.,) would often sell for several times more than that we have mentioned, but we do not take these into the account.

What, then, is the value of a good, well managed apple orchard, per acre, and at different ages in growth? If well cultivated, the trees may be regarded as full grown at fifteen years, and they will continue to bear from 30 to 50 years more. Casualties, or danger of dying, would not exceed 10 per cent., the owner spending not over one dollar per acre yearly, in destroying borers, caterpillars, &c. The crop will vary with seasons, but on good trees of properly selected sorts, the average will be eight bushels yearly. (In abundant seasons it will be frequently three times as much.) Forty trees per acre, will give 320 bushels. At 20 cents per bushel, on the tree, an acre will yield \$64. Deduct 10 per cent. for casualties, 10 more as allowance for the limited duration of the orchard, and \$1 for assaults on insects, and the yearly return will exceed \$50. This is the interest, at 7 per cent., on \$700 per acre—or \$17.50 per tree—which may be fairly reckoned as the true value of the best orchards. Poor ones, uncultivated, unpruned, enveloped in suckers, and of unsaleable or unproductive varieties, would be indefinitely lower. (We have sold a good orchard at \$600 per acre, and the purchaser was abundantly satisfied.) The *cost* of such an orchard may be easily reckoned. The 40 trees, and freight on them, \$10; transplanting, including thorough preparation of the ground, \$8; land, say \$100 per acre; total, \$118. The crop of potatoes, beans, turnips, &c., among the trees, until they are grown, or begin to bear, would pay interest on the land. The net profit, therefore, per acre, would be \$582.

The orchard at eight years, or half grown, would not produce more than one-fourth or one-third the amount in eight years more, but in view of its constantly increasing value, it would be safe to estimate it at half price.

These estimates, it must be particularly observed, are for well selected and *well managed* trees. It would be safer not to make any estimate or calculation whatever, on neglected ones, such as nineteen-twentieths are, of all that are set out.

Peach orchards. Estimates on peach orchards are more difficult, because the crop quickly perishes, and more knowledge, care and skill, is required in marketing. The market, as well as the crop, is more uncertain, and the trees are of shorter life. In some places, they will not live over 10 years; in others they endure 20, and with good management, 30 years. The fruit of the finest sorts may sell for 50 to 150 cents per bushel, on the tree; and in

the best localities, such as along the south shore of Lake Ontario, the crop will be good three-fourths of the seasons. If trees yield a bushel yearly, as an average, they may be estimated at the lowest at fifty cents yearly per tree, and two hundred trees per acre, (15 feet apart,) would give \$100 yearly—the interest on \$1,400 per acre. Deduct 50 per cent. for casualties and short life, and the value would be about the same as for an apple orchard, for trees just coming into good bearing, in localities where they grow and bear best. This estimate is much at random, will be thought by many as too low, and will vary greatly with circumstances.

Pear orchards, are either good for nothing, or so profitable as to present apparently fabulous estimates. If standards, the trees are more difficult to transplant successfully than the apple and peach; and if dwarfs, which are very easily transplanted, better cultivation is required than nineteen-twentieths of the owners are willing to give them. But when in good bearing condition, if intelligently managed and marketed, the profits are very heavy. Single standard trees, with but little care after they are full grown, have yielded, for a series of years, from \$20 to \$30 annually. A hundred such per acre, (20 feet apart,) allowing 50 per cent. to fail, would be \$1,000 to \$1,500, which, allowing 50 per cent. more for casualties and limited duration, would be \$7,500 to \$10,000 for the ten acres. This would not be an extravagant estimate for well selected, well managed trees, and skillful marketing. For neglected trees, of poor sorts, it would be about \$7,500 to \$10,000 too much.

The long time required to raise such an orchard, is the reason there are so few, our people being either too impatient for so long a delay, or, which is a still more frequent reason, entirely unwilling to give them the attention they should receive during the early stages of their growth.

Dwarf pears are transplanted with facility, and a young orchard is easily started; but very few ever arrive at good profitable bearing condition. This is owing to several reasons; a prominent one is, that it is nearly impossible to induce the owners to give them a mellow, cultivated soil. When the essential requisites of good management are regarded, and the locality has been a favorable one, the best results have followed. Ellwanger & Barry, T. G. Yeomans, W. P. Townsend, T. R. Austin, and others, have obtained from their dwarf pear orchards various sums, ranging from \$400 to \$2,000 per acre, in favorable seasons. One of these, which yielded in a single year \$500 from one-fourth of an acre, was simply manured, and cultivated with two horses abreast, between the rows, at less cost than is required for the culture of corn—the whole probably not amounting to \$3 for the quarter acre. Neglected, as most orchards are, they would not probably have afforded \$10; consequently, the nett profits of good management were over \$480. In the instance here mentioned, the crop sold for \$14 to \$35 per barrel, and well grown fruit may be safely reckoned, at any time, at the lowest, at \$2 to \$3 per bushel, on the tree. We may estimate the value of an orchard, therefore, as follows: Average product of good trees, of the best sorts, one bushel;

number of trees, per acre, 600 ; product in dollars per acre, annually, \$1,200 to \$1,800. Making allowance of 50 per cent. for liability to fire-blight and other disasters ; and then 50 per cent. more for limited duration of the trees, and the yearly income would be about \$350, which is the interest on \$5,000 per acre—a fair estimate of the real value of a good, well treated acre of dwarf pears, just coming into full bearing.

TRAINING WEEPING TREES.

WEEPING Ornamental trees are often allowed to grow irregularly, and of some sorts the branches become too drooping, and present a less ornamental appearance than when pains are taken to give them a symmetrical form.



Fig. 1.



Fig. 2.

For example, Fig. 1 shows the common way in which the new weeping willow is left to grow of its own accord ; and fig. 2 is the same, trained into a fine umbrella shape, by means of hoops tied beneath, at the places indicated by dotted lines. The branches in a few years become stiff enough to support their own weight, and the hoops are then removed.

REMOVING LARGE TREES.

FOR common practice, and with good cultivation, it is now fully established that small trees, well removed, will become larger and better with a few years growth, than when transplanted of large size. In transplanting from nurseries, small trees are therefore selected by skillful cultivators. There are cases, however, where the removal of large trees becomes desirable—such, for example, as thinning out plantations, or transferring trees from one part of the same grounds to another. To do it imperfectly, or by mutilating the trees in a hasty manner, would be no better than throwing them at once away. A large mass of the roots must be carefully secured, and this cannot be done without conveying with them a large ball of earth. Nor should the operation in any instance be performed on such as are more than three or four inches

in diameter, and twenty or twenty-five feet high. The operation succeeds better with evergreens than with most deciduous trees, on account of the more circumscribed and denser mass of fibrous roots. It is commonly performed in winter, with a frozen ball of earth; but if done in spring, it is equally successful, and the labor is not one-half that of cutting frozen earth.

One of the simplest and easiest modes of removing the trees that we have met with, is that practiced by W. P. HOWLAND, Esq., of Aurora, N. Y., who has carried evergreens twenty feet high or more, with half a ton of earth on the roots, with the labor of two men and a single horse. A large number of trees were thus removed, and so successful was the work, that, supplied as they were with mellow and rich earth outside the balls, they actually grew more the following summer than they had for any single year previously.

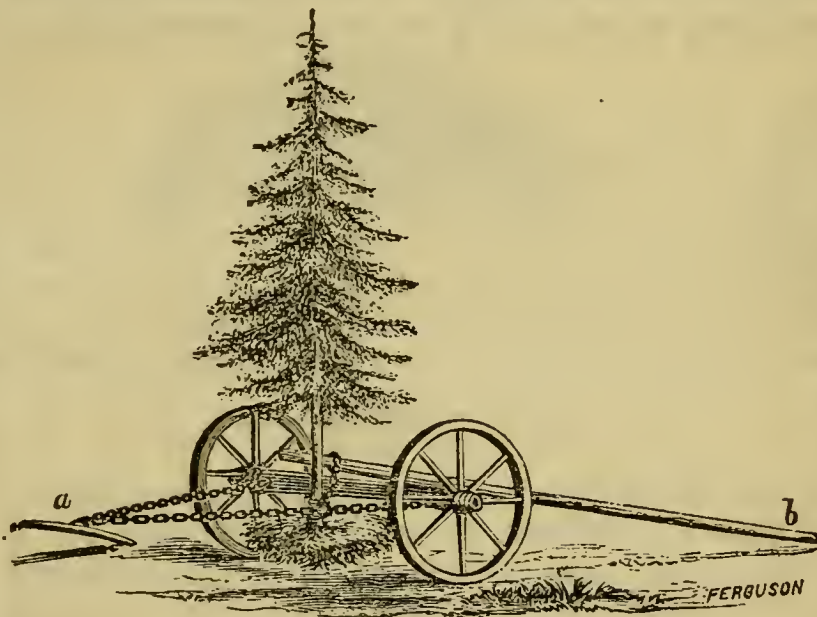


Fig. 1.

The trees are first dug about and completely loosened.—A piece of carpet or thick sacking is then wound about the trunk for a foot or two, to prevent any accidental chafing. An iron ring, shaped as in fig. 3, and 5 or 6 inches long, is then fastened to the trunk close to the ground, by passing through it and around the trunk, a broad strip of stout sacking—strong enough to hold the weight of the tree, fig. 4. The hinder wheels of a common farm wagon, with their axle, are then run up near the tree behind it. Chains attached to the axle, as shown in fig. 1, enable the horse to draw it, when hitched to the whiffle-tree, *a*. The long lever *b*, is then placed upon the axle, which serves as a fulcrum, and the hook at its end, (shown in fig. 2,) is hooked into the ring already mentioned. By bringing down the end *b* of this lever, (fig. 1,) the tree is hoisted out of its hole, as shown in the figure. One man holding the lever *b*, and the other driving the horse, it is carried and deposited at the exact spot desired; it is lowered into the new hole with the same ease that it was raised from its former position. After

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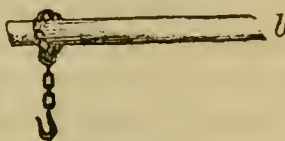


Fig. 2.



Fig. 3.



Fig. 4.

the digging has been performed, the whole operation is completed in a few minutes, and there is no hard lifting, grunting, nor severe strain of the vertebral column, but all is done with ease, satisfaction, and precision.

Where other trees stand thickly, and in the way, the pole may be first set upright against the side of the tree, and both tied together a few feet from the ground; then by bringing both down horizontally, the tree is drawn off without interfering with others. A rope attached to the end of the pole will enable the operator to lower it easily.

FORTUNES SUNK.

WE know a farmer over sixty years old, who has worked hard for more than forty years. He began with a good 150 acre farm given him, but subject to an incumbrance of about one-third its value. This was a good start. He is, after a lapse of forty years, still in debt. He is temperate; had he not been, his farm would have gone long ago. He has worked hard; had he not, he must have failed. He has been economical, in its common meaning, or he never could have kept even with his creditors.

What, then, has kept him back in the world? We have figured up, and found that he has virtually sunk three good estates, by a want of management.

First. In wintering his cattle and sheep. He kept, generally, about 20 cattle and 100 sheep. The cattle trod about three tons of hay under foot each year, and consumed half a ton each extra by exposure to the winds, in all 13 tons, worth \$91. This exposure of cattle and calves reduced their size and market value one-third—annual increase, 6 head, and average value lost, \$8 each—\$48. Ten per cent of his sheep and lambs were lost by want of shelter, and the clip was diminished 25 per cent. from the same cause—total loss on sheep, per annum, \$50. The whole yearly loss on cattle and sheep was, therefore, \$189. In forty years this annual loss, with compound interest, would amount to about \$35,000. Thus one fortune has been sunk.

Secondly. In a want of good rotation of crops. He raised wheat after wheat, oats after oats, and corn after corn, because the stubble was most easily plowed, till his land was exhausted, and full of weeds. The crops, as a whole, scarcely paid his labor. A good rotation would have safely given him one-third more, which would have been a clear gain, on an average, of at least \$5 an acre, on about 50 acres, yearly—total, \$250 a year. This loss repeated for 40 years, and interest, would amount to more than \$50,000! This was the second fortune sunk.

Thirdly. In raising crops of weeds. Some of his pasture fields had a heavier growth of mulleins, rag-weed, johnswort, and thistles, than of grass; consequently, at least half his land was wasted to grow them. On 50 acres

of pasture, at least \$2 each were yearly wasted, to say nothing of the loss of grain by the Canada thistle patches, in retarding growth and preventing clean harvesting, and his greatly diminished crop of corn by fox-tail and pig-weed. The annual loss from weeds was, therefore, at least \$100—the amount of which, with interest, in 40 years, would be \$20,000. The third fortune.

There are several other items of bad management that might be added, but these will do at present.

If any one doubts these estimates, let him examine carefully the amount raised by one of our best and thriftiest farmers, and from this amount deduct what is produced by a poor manager; then calculate compound interest, adding in the yearly loss, for 40 years, (the period of active business,) and he will probably find that on 150 arable acres, not merely the \$110,000 have been virtually sunk, but a much larger sum. If, however, the yearly loss should be much less, all we ask is that the reader may take that diminished amount and go carefully through the calculation, and he will doubtless perceive why some men get rich at the business and others do not.

FRUITS AND FRUIT CULTURE.

Rules for Pruning Grapes.

Hovey's Magazine gives substantially the following general rules for grape pruning, after recommending grape-growers to be free in the use of the knife, followed by the remark that where one vine is pruned too severely, nine are not pruned enough:

1st. No shoots should be nearer than one foot of each other.

2d. Prune back to within one eye of the old wood, every fall and spring, about one-half of the annual shoots—the remaining eyes producing canes to be retained for bearing next year—when the old bearing wood is in turn to be cut out, to make room for new shoots.

3d. Disbud or rub off, as soon as they appear, all shoots not wanted as bearing wood.

Directions for Transplanting.

1. First, have a good, deep, dry soil—well underdrained, if wet. Bad fruit is often caused by hidden water standing below the surface.

2. If not very fertile, it must be enriched by manure, which is best done a year or two before planting, as fresh, unmixed manure should never touch the newly set roots. Or strips of land eight feet wide for each row, may be deeply plowed with the dead furrow in the middle, (to promote drainage,) half a load or less of old manure or compost, placed

for each tree, and thoroughly harrowed into the soil before setting.

3. If the ground has been well and deeply mellowed and enriched, the holes need be only large enough to receive the roots without bending; otherwise they should be five or six feet across, and a foot deep. On heavy land, inverted sods are good in the bottom. Large holes, filled with rich earth or old compost, will cause young trees to grow rapidly. Never place manure near the roots.

4. Pare off with a knife all bruised parts of the roots, to prevent decay. Place the tree no deeper than it stood before—less deep is better than more. Fill the fine earth carefully among the roots, spreading them all out with the fingers. No cavities should ever be left among or beneath the roots, and the earth may be well settled among them by pouring in water when the hole is part filled. All except small trees need staking to protect from the wind.

5. Autumn and spring are both good seasons for transplanting—except that tender trees, as peach and apricot, do best in spring, unless on a dry bottom. The autumn is the better season to procure trees from distant nurseries, even for spring planting. They may be safely wintered by burying the roots deeply in the earth, in a dry, sheltered situation. Trees should be always well shortened or cut in at the head, when set out.

6. **GOOD, CLEAN CULTIVATION, IS OF THE MOST IMPORTANCE.** Neither corn, potatoes, nor fruit trees, can flourish surrounded by weeds and grass sod.

7. Watering usually injures young trees by baking the earth. If necessary, lay the roots bare, pour on the water, and replace the earth. A rich soil, **KEPT MELLOW**, will not need water. Young cherry trees often die about

midsummer, unless **MULCHED**, or with the earth about them covered several inches with old straw, or other litter. Trees dried by long carriage, may be restored by immersion for a day or two in water.



Fig. 1.

Root-Grafting the Grape.

This mode of propagation is becoming extensively adopted by nurserymen. The accompanying figure shows how it is done. The cleft is made in a short graft, and a small root, an inch and a half long, is inserted. (Fig. 1.) The parts are bound well together with strips of waxed paper, leaving a small portion of the lower end of the graft open, for the free emission of roots. They are then subjected to a bottom heat under glass, and soon make growth. They are transferred to pots once before being set out in the open ground, and they make good saleable plants by autumn. The grafting is done about mid-winter, or later.

Depredators and Diseases.

MICE are excluded by banking up a foot around every tree, late in autumn—**CURCULIOS**, by jarring down on sheets daily, and by turning in pigs and geese—**APPLE TREE BORERS**, by punching to death in their holes with a small twig—and the **PEACH WORM** by cutting out with a knife. **FIRE BLIGHT** in the pear must be instantly cut off far down, and the branches burned—and the **BLACK-KNOT** may be kept off the plum by prompt and continued amputation, beginning in time.

Apples for the West.

The following carefully selected list of apples, for the Northern, Middle, and Southern portions of Illinois, adopted by the Illinois Horticultural Society, will apply to any of the Western States, of corresponding latitudes:

NORTH ILLINOIS.—For general cultivation. **SUMMER.**—Early Harvest, Carolina Red June, Duchess of Oldenburg, Keswick Codlin, Sweet June.

AUTUMN.—Fameuse, Maiden's Blush, Fall Swaar, (of the West,) Bailey's Sweet, Lowell.

WINTER.—Winesap, Rawles' Janet, Domine, Jonathan, Willow Twig, White Pippin, Yellow Belleflower, (on clay soil,) Roman Stem, Red Romanite, (of poor quality, but an abundant bearer and long keeper,) Tallman's Sweet, Fulton.

For Amateur Culture.—**SUMMER.**—Benoni, Red Astrachan, Early Pennock, Summer Queen.

AUTUMN.—Fall Strawberry, Holland Pippin, Fall Wine, Northern Sweet, Striped Giliflower (or Scollop.)

WINTER.—Seek-no-Further, (Westfield,) White Winter Pearmain, Herefordshire Pearmain, English Golden Russet, Michael Henry Pippin, Swaar.

The Committee for Central Illinois reported the following lists:

For general cultivation.—**SUMMER.**—Early Harvest, Sweet June, Carolina June, Hocking, Benoni, Summer Pearmain, Keswick Codlin.

AUTUMN.—Maiden's Blush, Fall Wine, Rambo, Bailey's Sweet, Fall Swaar, (of the West,) Fameuse, Trenton Early.

WINTER.—Jonathan, Fulton, White Belleflower, Yellow Belleflower, Roman Stem, Domine, White Pippin, English Golden Russet, Milam, Smith's Cider, Wine Sap, Janet, Willow Twig, Limber Twig, White Pearmain, Little Red Romanite.

For Amateurs they add to the above list:

Sine qua non, Summer Rose, Fall Pippin, Paragon, American Golden Russet, Red Canada, Swaar, Pryor's Red, Esopus Spitzenburg.

For further trial.—Red Astrachan, Red Seedy Fringe, Ragan Apple, Herefordshire Pearmain, Minkler.

The above lists were adopted.

SOUTH ILLINOIS.—**SUMMER.**—Early Harvest, Carolina June, Red Astrachan.

AUTUMN.—Maiden's Blush, Fall Queen or Buckingham, Rambo.

WINTER.—Rawles' Janet, White Winter Pearmain, Limber Twig, Wine Sap, Yellow Belleflower, Carolina.

Selection of Hardy Grapes.

The Fruit Growers' Association of Eastern Pennsylvania took a vote on the best varieties of hardy grapes, with the following result:

	VOTES.
Concord,	9
Delaware,	8
Diana,	7
Clinton,	6
Isabella,	5
Hartford Prolific,	3
Catawba,	3
Taylor,	1
Cloentha,	1
Ontario,	1
Cassiday,	1

Young Cherry Trees.

A large portion of newly transplanted cherry trees die about midsummer, after having appeared in leaf, resulting from dry and hot soil at the roots. Water often increases the difficulty, and kills them by making a hard crust. If water is applied at all, the earth should be first removed from the roots, and a copious supply poured on. But this too is of little use. The roots are drenched for the moment, and in a short time are as dry as ever. The only remedy is a thick, heavy mulching. If of old straw, it should be about 6 inches thick, and several feet in diameter.

High Prices for Pears.

T. G. Yeomans, of Wayne county, whose success as a pear grower has frequently been alluded to in the *COUNTRY GENTLEMAN*, has been very successful the past season, both in growing and selling his fruit. A Rochester paper says: "This year he has had remarkable success, and has raised some of the most magnificent specimens of fruit ever exhibited. One barrel of Duchess d' Angoulemes, which he sent to Philadelphia, contained only one hundred and twenty five pears. The fruit alone weighed one hundred and twenty-seven pounds, so that the pears averaged over a pound each. This barrel sold for \$35.63, and the purchaser trebled his money in retailing it. Four other barrels sent by Mr. Yeomans, to the same market, contained one hundred and fifty-two, one hundred and sixty-one, one hundred and sixty-two, and one hundred and sixty-five pears respectively. The best eleven barrels sent off, were sold for over \$300."

The Glout Morecean Pear.

On the grounds of Edward W. Herendeen, of Macedon, Wayne county, N. Y., a single dwarf tree of the Glout Morecean Pear, eight years planted, bore the past season one barrel of excellent fruit. It had received but moderate cultivation. The pears were large and fair, and ripened into a fine flavor on the approach of winter. Ellwanger & Barry, of Rochester, as we may have stated on a former occasion, have sent their crops of this pear to the New York market, where they have sold early in winter, when in fine eating condition, at three dollars per dozen.

Broadcast Cultivation.

S. G. MINKLER, of Illinois, has found that well cultivated young apple trees, set out two rods apart, meet at the roots in eight years. Hence the importance of cultivating or manuring the whole surface, instead of a small circle at the foot of the tree, as too often practiced.

Apples in Wisconsin.

The Northwestern Fruit Growers' Association have recommended the following varieties for general cultivation, in Wisconsin:-- Red Astrachan, Sops of Wine, Carolina Red June, Duchess of Oldenburgh, St. Lawrence, Wagoner, Pomme Grise, and English Golden Russet. The last was very highly commended for Western culture. Early Harvest, although not hardy, yet on a firm, dry soil, with a low top, was regarded as valuable. Early Joe had proved hardy and productive, and well adapted to amateur culture. Maidens' Blush was well esteemed, but somewhat tender. Fall Orange always did well. Jersey Sweet, Rambo, Domine and Vandevere Pippin had proved too tender. Fall Wine slightly so, and very productive. The Baldwin was found to be very tender, quite unproductive, and of no value. The English Russet succeeded only on high and dry soils. The Red Romanite quite hardy, but the quality poor. Herefordshire Pearmain was highly recommended; usually hardy on dry soils, but failed on low grounds. Rawles' Janet was found to lack vigor of tree. Northern Spy succeeded well. Blue Pearmain, although hardy and good, was very unproductive. Tallman Sweet and Fameuse were both highly recommended.

Hardy and Tender Trees.

ELI NICHOLS, an experienced fruit raiser, of Ohio, justly remarks: "Some, recently, have made a great mistake, in concluding that the cold winters kill or spare trees without rule or reason. A somewhat extensive observation shows me, that where trees are good, sound, healthy, they are not killed. On well drained ground, with manure enough to give healthy vigor, the tree has lived. Treated the same, on much richer land, or with water at the roots, it died. Manuring trees on ground already too rich, has proved fatal--on poor land, it has saved the tree. On thin lands, thorough cultivation cannot injure; on rich bottoms, or highly manured lands, it may, especially if late."

Culture of the Blackberry.

Procure plants which have been propagated from cuttings of the roots, (suckers are apt to be one-sided, and destitute of small fibres,) of moderate or rather small size, as these succeed best. Plant them in a good rich soil, good enough for corn or cabbages, about four by six feet. Cultivate them well, if the plantation is extensive, by horse power, and in summer, as soon as the shoots are three or four feet high, pinch off the top to induce a thicker growth, and to send out side shoots. These will bear another year.

Dwarf Apples.

It is possible that the dwarf apple may become more popular than the dwarf pear. It is not liable to the accidents of the latter.

All sorts of apples grow freely on the dwarf stock, and it is not necessary to take that particular care in selection, founded on many years of experience—although some sorts of the apple form handsomer and better shaped heads when treated as dwarfs than others. The symmetrical growers should be selected, because they make the process of pruning simpler, and more easily give the desired shape.

Common standard apple trees occupy too much room for gardens and small places. At the commonly recommended distance, 33 feet, only 40 can stand on an acre; and placed at the nearest distance admissible, 25 feet, an acre is required for 69 trees. A quarter-acre village garden can therefore have only 10 trees at the former, and 17 at the latter named distance, if apple trees occupy the whole ground. But dwarf apples may stand about four times nearer, giving sixteen times as many trees on the quarter-acre. If, therefore, one-half the quarter-acre garden is occupied with dwarf apples, 85 trees may be planted at eight feet apart, a suitable distance for the Doucain dwarf, or 150 at six feet apart, the space for the smaller or Paradise dwarf.

The best varieties for dwarf stocks, as a general rule, are those which naturally form a round or oval head. Such will need but little pruning. Among these are the Red Astrachan, Jersey Sweet, Porter, Baldwin, Dyer, Monmouth Pippin, Summer Rose, Benoni, and Sweet Bough. There are others that incline to grow upright, and need some pruning to prevent their running upwards, and to induce spreading; among these are the Northern Spy, Twenty Ounce, Lady Apple, Wagoner, Early Strawberry, and Bailey Sweet, all of which make handsome dwarfs. There are again others, although not so handsome growers, yet the ornamental appearance of the fruit renders them desirable dwarfs, as the Fameuse, Red Canada, Carolina Red June, Munson Sweet, &c. There are still others, which grow so irregular that some care would be required to make handsome trees of them, such as Fall Pippin, Canada Reinette, and Tompkins County King. Dwarf apples should be mostly confined to summer and autumn varieties, in order to furnish a fresh supply for the table of the most desirable sorts.

Winter apples may be most profitably raised in orchards of large trees, or purchased in market by the barrel.

Dwarfs are especially desirable for those who plant new places, and consequently desire an early return. The Paradise stock will give crops the third year; and the Doucain the fourth, in abundance. A fine young collection of dwarfs, now four years planted, and growing their fifth summer, bear much better this unfavorable season, than old orchards. Some of the trees are loaded. A Hawthornden is so full that the branches densely set with apples, lie on the ground with their loads of fruit, now in the second year of such profuse bearing. The Doucain trees are about 7 feet high, and the Paradise 5 to 6 feet. The soil is fertile, and always well cultivated.

Transplanting Strawberries.

The best time for transplanting strawberries is early in the spring—the operation is then easily performed, and nearly all the plants will live and grow; and if they are of productive sorts, they will bear a small or moderate crop the same season.

The next best is just after bearing, or about midsummer. But more care and labor is then required, and some of the plants are apt to die. All the large leaves must be taken off, leaving only the young or opening ones—the roots should be previously dipped in mud and then spread well out at setting—the earth settled about them by pouring in some water, and the surface mulched with an inch or so of fine manure, being careful not to cover the crown of the plant. They will grow considerably, and bear the next year.

Setting out in autumn succeeds well if the proper requisites are attended to; but carelessly done, usually fails. The earth should be well packed, or trodden hard, about the plants, or the freezing will lift them out and kill them. They should be of hardy sorts, to endure the winter; the Wilson is especially adapted to this purpose. And they should be protected by a covering that will not settle down compactly on the plants and smother and destroy them. Fresh moss is perhaps the very best thing for this purpose, or the leaves of evergreens, or rather the small shoots containing the leaves. With this care the plants will keep well and start early; without it they will very likely be thrown out and frozen to death.

Varieties inclining to be tender, as the Hooker and Hovey, are not well adapted to autumn transplanting.

The principal advantage of this season is for plants that have to be carried a long distance, or from a remote nursery, from which a supply could not be obtained early enough in spring.

DOMESTIC ANIMALS.

The best Doctor for Animals.

We have seen a great deal of doctoring for sick animals—some successful, and a great deal of it unsuccessful—and we have long since come to the conclusion that the most skillful physician that we have ever met with is Doctor NURSE. If an animal, (as well as human being,) is not carefully taken care of, nursed, all the medicine in the world can do but little good. And, on the other hand, with good nursing, medicine is generally unnecessary. Our own observations lead to the opinion that in at least nine cases out of ten, as commonly administered, medicine does more harm than good.

An eminent New-York physician said that taking medicine was always a choice of evils—that, being poisons in nearly all instances, they necessarily did harm to the system, and were never to be employed unless there was a strong probability that they would benefit more than injure. This is not the rule adopted in doctoring horses, by most horse jockies and others having care of these animals, if we might judge from the way in which gunpowder, salts, red pepper, turpentine, whiskey, corrosive sublimate, and other violent remedies, are administered at hap-hazard, increasing in nearly all cases the violence of the disease. It may be laid down as a general rule, that it is much safer to give too little than too much medicine; and that none should be given unless we know distinctly how it is to operate, and what it is for.

Some years ago, a valuable horse caught cold, and was troubled with a cough so severe that he might be heard half a mile, and which appeared to be rapidly reducing his flesh. We had an abundance of prescriptions from neighbors, of all kinds of frightful medicines, enough to have killed him had he been in perfect health. We concluded to discard all, and to place him under the attention of Dr. NURSE. Great care was taken never to work him to perspiration—he was blanketed whenever the weather was chilly—he was fed regularly and moderately on succulent food, all such food partaking of the character of expectorants, and favoring a free discharge from the lungs—and all his other wants were observed as well as we were able to, and promptly supplied. In six weeks he was perfectly well. Had some nostrum been employed, it might have injured him, and prevented recovery; or if it had not, Dr. Nurse might not have been called in; but if he had, and the medicine had not

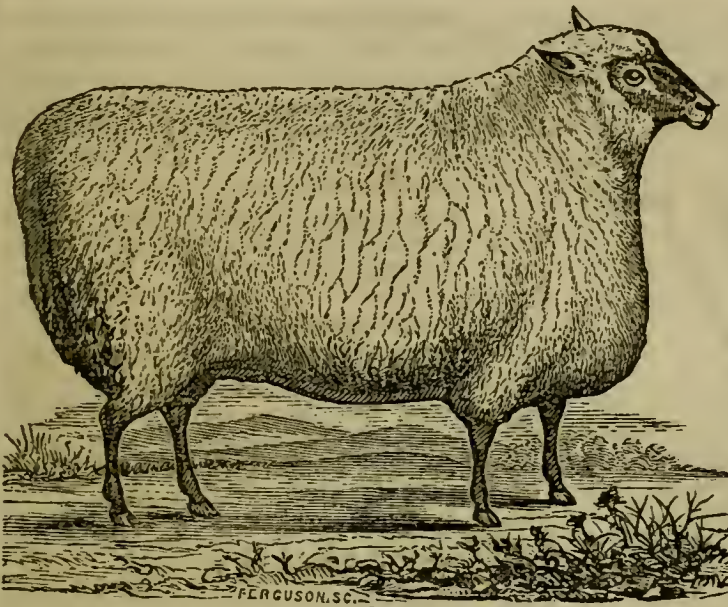
greatly retarded his recovery, and he had got well in six months, it would unquestionably have been regarded as an extraordinary cure.

At another time, a valuable mare, eleven years old, was badly sweeney by hard work, the worst case of sweeney we ever met with. It was generally regarded as a hopeless case, but various remedies were proposed and offered, costing from \$20 down to \$3. We concluded that our old friend Dr. Nurse should be again called, to the exclusion of all these fellows, and the consequence is, that with simply careful, moderate treatment, the animal is well, and the sweeny filled up.

The majority of sick horses get well; every owner tries some remedy; and that particular medicine that he happened to be using at the time, gets all the credit—although, as a general thing, it retarded more or less his recovery.

We must make one exception in the general rejection of medicines—there is one, which if given moderately can scarcely ever injure, and may often do much good. This is powdered charcoal—a powerful antiseptic, and absorbent of bad matter, while, unlike most other medicines, it does not irritate—a most important advantage. A clear illustration of this advantage recently occurred in the case of a fine calf five months old, which had become bloated by eating too many apples, blown down by a violent gale. Its sides became distended by wind to an almost incredible size; a solution of saleratus was poured down its throat repeatedly, and as often thrown out violently, on account of its irritating action on the throat of the young animal. It continued for eighteen hours, with little or no improvement, when a large tablespoonful of powdered charcoal mixed with half a pint of water, was given. The dose was swallowed without any difficulty, and in four hours the calf appeared to be perfectly well. Charcoal may be given in nearly all cases of derangement of the digestion, whether with men or beasts, with great advantage. One-half to a teaspoonful is a full dose for a man, and as much more for an animal as its food exceeds that of a man.

We do not mean to say that there are not other medicines that do not occasionally prove eminently useful; but unless they can be given understandingly, with a full comprehension of their mode of action, and with an undoubted knowledge of the exact nature of the disease—and their use sanctioned by very clear and distinct previous success—it would be much safer to discard them.



Shropshire Down Sheep.

In former numbers of this work we have given portraits of most of the prominent breeds of sheep. The above engraving represents a breed—the Shropshire Downs—now rapidly coming into notice and repute in England. They are originally descended from a hardy mountain breed, through which they inherit an excellent constitution. This enables them to thrive on some of the most exposed districts; while on more fertile pastures they evince a rapidity of growth, and natural tendency to a heavy weight at an early age, certainly not surpassed by any other breed. We have had the cut drawn and engraved from a fine plate in a recent number of the Farmers' Magazine—which speaks of the sheep themselves as admirable for "splendid quality of meat, broad chines, and full plaits, and wonderfully good loins and rumps."

Wintering Sheep.

The three great requisites for successfully wintering sheep are, 1, good and regular water and food; 2d, good, clean shelter; and 3d, keep them in small flocks. The following is the method adopted by ROBERT J. SWAN, of Geneva, N. Y., one of our best farmers:

I consider, for my fattening sheep, the best mode is to have good deep sheds, (34 feet,) racks to receive their straw or hay, and troughs to feed their meal in, and keep the yards well littered with straw. We feed, to fattening sheep, two bushels of corn or two bushels of oil cake meal, to the hundred sheep, with plenty of good bright wheat straw three times a day, till the 1st of March, at which time we give them hay, in their racks, three times a day, and one bushel of

corn or oil meal per day per hundred. My store sheep we give plenty of bright oat or wheat straw in racks, three times a day, and one bushel of corn or oil cake meal per day per hundred, till the 1st of March, at which time I give them hay and no grain, but always take good care to see that all my stock yards are well littered with straw. My lambs I feed hay three times a day, and three pecks of oil meal or corn meal to the hundred. All the yards well supplied with water.

I never lose my sheep in winter, but more in summer, and those the fattest and the best—about two per cent.—

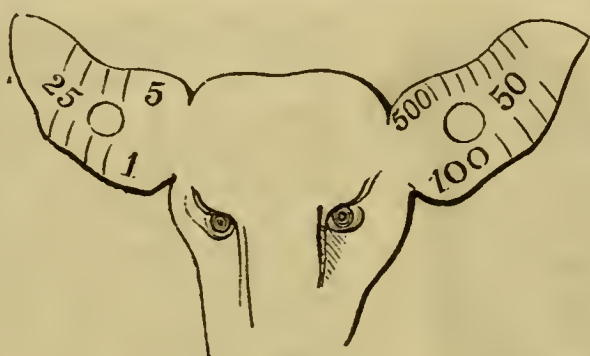
Judging from what I have noticed, on Mr. Johnston's farm, I think the fine wooled sheep less subject to disease than the coarser breeds. Where small flocks of coarse wooled sheep are kept, I think them healthier than those kept in larger, or in moderate sized flocks. Having been a pupil of Mr. Johnston, I adopted his course of farming, both in cultivating my farm, and fattening my sheep.

Training Cattle to Jump.

A western farmer says he makes it a rule that whenever cattle are made to pass a fence, whether through bars or "slip-gap," to leave one rail for them to pass under. This gives them a downward tendency, and lessens their inclination to jump or look upwards, as they are sure to do when a lazy attendant throws down a part of the rails, and makes them vault the rest. Cattle may be learned to go over any fence, by the careful training they often get for this end, and performed as follows:—First starve them, or give them poor feed, which will make them light and restless. As soon as they go over the lowest part of the fence after better provender, make them jump back again, and put on one more rail, saying, "I guess that will keep 'em out." Next day, (as of course they will be in mischief again,) repeat the process, adding another rail; in a short time they will take care of themselves, and harvest the crops without charge.

To make Horses Canter Slowly and Gracefully.

Col. PRATT, who has owned great numbers of horses, teaches them a slow and easy canter, under the saddle, by riding them long distances up hill.



Registering Sheep.

The above cut illustrates the German mode of ear-marking and regularly numbering the sheep belonging to a flock, so that each individual can be distinctly registered:

Each slit in the lower rim of the right ear represents.....	1
Each slit in the upper rim of the right ear represents.....	5
Each slit in the lower rim of the left ear represents	100
Each slit in the upper rim of the left ear represents	500
The central hole in the right ear represents.....	25
The central hole in the left ear represents.....	50

In the above figure:

7 slits in the upper rim of the left ear, 500 each	3,500
4 slits in the lower rim of the left ear, 100 each	400
The central hole in the left ear	50
4 slits in the lower rim of the right ear, 5 each	20
4 slits in the lower rim of the right ear, 1 each	4
The central hole in right ear.....	25

Number of the sheep..... 3,999

Bringing Sheep out of Winter.

The Ohio Cultivator gives the following as Gen. LAHM's mode of preparing for spring—the most difficult season for sheep. It is well to feed animals well on the approach of such a season, but it is still better, easier, and safer, to give them good and regular food, and good management all the year round:

Our lambs come from the 20th of April to the middle of May, and that the ewes may be strong, and have an abundance of milk, we commence to feed a little bran and oats in March, and continue it until they get a sufficiency of grass. A ewe in good condition, and with a good flow of milk, seldom gives the shepherd any trouble, but the reverse with the sheep, the reverse with trouble.

More than this, a lamb raised by a half-fed ewe, is not worth anything when raised. Ewes should not be fat, but in good condition; and for several weeks before the lambs come, the ewes should be fed with a view to have a sufficient quantity of milk for her lamb. There is nothing better for this purpose than oats and wheat bran, with good hay or corn fodder.

To Prevent Horses Kicking.

Having a horse that would kick every thing to pieces in the stable, that he could reach, and having found a remedy for it, (after trying many things, such as fettering, whipping, hanging chains behind him for him to kick against, &c.,) I send it to you. It is simply fastening a short trace-chain, about two feet long, by a strap, to each hind foot, and let him do his own whipping if he cannot stand still without it, and he will not need to have boards nailed to his stall every day.—COUNTRY GENTLEMAN.

How to make Cheap Beef.

Many farmers are adopting the mode of disposing of their young animals for beef before passing through the second winter, provided they are fine, well grown animals, and in this way they have the growths of two summers and but one winter. The following is the mode adopted by a correspondent of the COUNTRY GENTLEMAN:

My stock for the last three years has consisted of good Durham grades, and I have just killed my first young bullock, aged 20½ months, and fed as follows: For the first three weeks he got the mother's milk pure; for the next four months plenty of good skimmed milk, good clover pasture, and nothing else. At the first approach of winter he was taken up, warmly housed, and fed good hay, and 100 bushels carrots and 12 bushels oats, ground, at 20 cents. This spring he was turned out to good pasture, and got nothing else till Nov. 18th, when he was fit for the butcher; but not wishing to kill him till the weather set in cold, I shut him up to the 11th inst., (Dec.,) and fed him hay and meal, at which date he was slaughtered and weighed, the four quarters, 688 lbs. The meat of a first rate quality, and very fat. I do not state this as being anything wonderful, (though it is here,) but I should like to learn if any of your readers can raise cheaper beef. By this plan of killing early beef, I get rid to a great extent of one great bugbear, the long winter, as I avail myself of two whole summers to one winter, and I find it cheaper to winter calves well, than grown beasts.

Beginning Winter Right.

A correspondent of the *CULTIVATOR*, alluding to the information he had derived from its pages, makes the following statement in relation to entering winter with animals in good condition:

There is one change which I now regret that I had not made sooner than I have, as I would thus have had fewer deaths among my flock of sheep, more milk from my cows, and my working stock in better condition for spring's work. I had seen it stated on several occasions—probably more than once in every volume—that it was of great importance to have sheep, and other stock, come to the yard or the stables on the approach of winter in good condition, and that it was bad management and poor economy to allow cows, sheep, or any other stock, in fact, to depend wholly on the dry, frozen pastures, as long as snow left them accessible. I had read more than once that it was almost impossible to get an animal that is poor at the beginning of winter, into any better condition while that season lasted. But though all these things seemed reasonable, and worthy of being attended to in practice, like some other of my neighbors, readers too of the same facts and admonitions, I neglected to conform my practice to what my judgment approved. This last autumn, however, I resolved to have my stock in the very best condition before winter should set in, and by feeding cows and sheep a little before they were let out into the fields in the mornings, and a little after coming home at nights, and by other similar arrangements, I managed to have them all fat or in a fair condition when snow came. And though the fear of not having enough hay to carry my whole stock through the winter has made us feed rather scantily, they are all in first rate condition now.

Regularity in Feeding.

Every good farmer knows that any domestic animal is a good clock—that it knows, almost to a minute, when the regular feeding time has arrived. If it has been accustomed to be fed with accuracy at the appointed period, it will not fret until that period arrives; after which it becomes very restless and uneasy till its food comes. If it has been fed irregularly, it will begin to fret when the earliest period arrives. Hence, this fretting may be entirely avoided, by strict punctuality; but it cannot be otherwise. The very moment the animal begins to worry, that moment it begins to lose flesh; but the rate of this loss has never been ascertained—it is certainly worthy of investigation—and can be only determined by trying the two modes,

punctuality and irregularity, side by side, under similar circumstances, and with the same amount of food, for some weeks or months together.

There is one precaution to be observed in connection with regular feeding, where some judgment is needed. Animals eat more in sharp or frosty, than in warm and damp weather. Hence, if the same amount by weight is given at every feeding, they will not have enough when the weather is cold, and and will be surfeited when it is warm and damp. Both of these evils must be avoided, while a little attention and observation will enable the farmer to do it.

Profits of Sheep Raising.

J. W. WORCESTER, of Pittsfield, Lorain co., O., gives the following statement, showing how wool-growing pays those who manage it as it should be:—Last season I clipped 250 sheep; the wool sold for \$552. I have sold, within the year, 74 sheep, which is equal to the number of all the lambs raised, for \$814, making \$1,366. My sheep are of the Spanish Merino breed, and mostly ewes; a few bucks and wethers. I have kept sheep the last 20 years, and consider it the most profitable business a farmer can engage in.

A correspondent of the *Ohio Farmer* says that Messrs. J. & E. W. Bingham, from their farm of 240 acres, (35 of which is woodland, and 40 under the plow,) have sold wool and sheep the past year to the amount of \$1,200, and still retain their former number, 350, and these much improved in quality. They have also four horses and ten head of cattle on the farm. The sheep were originally from the Dickinson and Wells stock, but improved of late years by a cross with a pure bred Spanish buck. Sheep husbandry, as carried out on this farm for the last 25 years, has always proved profitable, and adds yearly to the fertility and productiveness of its soil.

Training Draft Animals.

This cannot be commenced too early—at first by acts of kindness, by which they become tractable and confident, and all feeling of fear is dispelled.

Colts and steers should be halter broken and yoked the first winter, and constantly handled, and this practice should never be discontinued. They must not, however, be worked hard while young, for many obvious reasons, but it is important that the training be done thoroughly, in which the art of backing is too much lost sight of. A well trained, orderly pair of cattle or horses, will always command nearly double the price of ordinary animals.

Swine Fed on Skim-Milk.

We published a few years since a statement of the successful feeding and fattening of swine on skim-milk, as practiced by Joseph Greene, of Macedon, N. Y., a mode, however, not entirely new. He fed spring pigs through the summer, and when six or seven months old, they usually averaged about 300 lbs. each. Three, at seven months, weighed in one instance, after being dressed, no less than 956 lbs. in the aggregate. Another animal, at six months and ten days, weighed when dressed 298 pounds. He ascribed his success to feeding undiluted milk, or in its most concentrated state, without any water thrown in. This made them grow rapidly, with solid square bodies, and not like the flabby animals produced when much liquid and little nourishment are given. The fattening was completed on the ground meal of old corn. They did not thrive well on new corn, and failed on "nubbins."

Several others have adopted a similar mode of treatment, with like success. One instance that has recently come to hand, is the following, reported in a late number of the Union Springs Herald:—

"David Anthony killed, on Saturday last, a litter of eight spring pigs, about 8½ months old, and the total weight of which were 2,350 lbs.—an average of 293 lbs. each—the lightest one weighing 280, and the heaviest 320 lbs. We call that hard to beat. If any one can do it, send on the figures."

On inquiring personally of David Anthony as to the mode of feeding adopted, he informs us that these animals are chiefly indebted for their rapid growth to the skim-milk that he gave them, of which he had a plentiful supply. He finished feeding them on 15 bushels of ground Canada corn, which was all the grain he gave them. He intends to plant a few acres of the Canada corn, for fattening his swine another year, as it is fully ripe before the first day of autumn, and is therefore found to be nearly equal to old corn for fall feeding.

Relieving Choked Cattle.

A Portland correspondent of the New England Farmer, gives the following easy and simple remedy:—"The instant a creature becomes choked, no matter what with, the throat becomes dry, and the longer the substance remains, the drier the throat. The following is a sure remedy. Take some oil, no matter what kind, and hold the creature's head up and turn down about one gill of oil, and then let go of the head, and the creature will heave it out in two seconds! I have tried it for years, and never knew it to fail."

Treatment of Sows with Young Pigs.

A correspondent of the Maine Farmer, who has had thirty years successful experience in raising pigs, says:

The hog goes with young sixteen weeks. They seldom vary twenty-four hours from that time. The feed should be gradually increased as much as eight weeks before they bring forth. For two days after, she should have no food except a little thin warm gruel, not to exceed half a pint a day of meal. She should have all the warm water she will take, which will sometimes be two pailfuls in a day. This is very essential, as it helps the flow of milk and prevents fever. You may now gradually increase the feed till the pigs are two weeks old, when she should be full fed. If you have no better feed, good Indian meal, mixed with milk, will answer very well, if you give enough and feed regularly. The pigs should be taught to eat with their mother as young as two weeks, which may be done by having a broad shallow trough, and gently putting them into it when the mother is eating.

Weaning Lambs.

Referring to this subject, W. H. Ladd of Jefferson co., O., (first rate authority on all sheep matters,) says:—"My practice is to turn the lambs in with their mothers, after they have been separated some 12 hours, and as soon as they nurse, separate them again; then, after 24 hours, allow them to nurse once more. Since I have adopted this plan, I have never had an ewe's udder injured. Lambs should have a very little salt frequently, when first weaned, as the herbage lacks the large proportion of salt which the mother's milk contains. But great care should be used not to give them much salt at once, or it will set them to purging; and if a lamb commences to purge soon after being taken from the mother, it seldom ever recovers from it."

To Prevent Colts Gnawing Reins.

Wash the reins in alcohol, in which aloes and assafoetida have been dissolved. One trial will usually effect a cure. The same result has been produced when a few seeds of red pepper have been thrust into small incisions in leather, left purposely within their reach.

Cattle Racks.

A western farmer who feeds 150 head of cattle, estimates that the construction of good feeding racks saves him at least 5 tons of hay yearly—more than enough to pay annually for the racks. Judging from the amount of hay we have often seen trodden in the mud, or used as litter by the cattle, as many tons would be yearly saved by some who have not 50 head.

RURAL ECONOMY.

Nails, Nuts, Screws and Bolts.

One of the component parts of a good farmer is mechanical ingenuity. Some lose half a day's valuable time, for want of knowing how to repair a breakage, which an ingenious person could do in five minutes. A team and two or three men are sometimes stopped a whole day, at a critical season, for want of a little mechanical skill.

It is well for every farmer to have at hand the facilities for repairing. In addition to the more common tools, he should keep a supply of nails of different sizes, screws, bolts, and nuts. Common cut-nails are too brittle for repairing implements, or for other similar purposes. Buy only the very best and anneal them, and they will answer all the ordinary purposes of the best wrought nails. To anneal them, all that is necessary is to heat them red hot in a common fire, and cool gradually. Let them cool, for instance, by remaining in the fire while it burns down and goes out. One such nail, well clinched, will be worth half a dozen unannealed.

Nothing is more common than for a farmer to visit the blacksmith shop to get a broken or lost bolt or rivet inserted, and often a single nut on a bolt. This must be paid for, and much time is lost. By providing a supply of bolts, nuts and rivets, much time and trouble may be saved. They may be purchased wholesale at a low rate.

These should all be kept in shallow boxes, with compartments made for the purpose, furnished with a bow-handle for convenience in carrying them. One box, with half a dozen divisions, may be appropriated to nails of different sizes; and another, with as many compartments, to screws, bolts, rivets, &c.

Every farmer should keep on hand a supply of copper wire, and small pieces of sheet copper or copper straps. Copper wire is better than annealed iron wire; it is almost as flexible as twine, and may be bent and twisted as desired; and it will not rust. Copper straps nailed across or around a fracture or split in any wooden article, will strengthen it in a thorough manner.

Farmers' Tools.

A certain number of tools and some skill in their use, will often save the farmer much time in sending for a mechanic, and some expense in paying him. Every farmer should be able to make small repairs on his wagons, gates, buildings, &c. A room, or a portion of a room, should be devoted to keeping these tools; a pin or nail should be inserted for

each one to hang on, and the name of each tool written or painted under the pin, that it may be promptly returned to its place, and any missing one detected. Keep every tool in its place—do not wait for a more convenient season, but return every one to its pin the moment it is done with. If left out of place a minute, it will be likely to remain a week, and cause a loss of time in looking for it, a hundred times greater than in replacing it promptly. Keeping everything in its place is a habit, costing nothing when formed. The tools should be, a hammer, saw, augers, brace and bits, gimlets, screw driver, wrench, two planes, chisels, mallet, files and rasp, saw-set, trowel, and a box with compartments for different sized nails, screws, nuts, bolts, &c. Common farm implements and tools, such as hoes, spades, shovels, forks, rakes, scythes, &c., may be in the same room, on the opposite side, and the same precautions taken to keep every one in its place.

**The Union Washing Machine.**

This proves to be a valuable machine in families of moderate size. A full trial proves it capable of washing about twice as fast as the common methods. The work is done by rolling and pressing the clothes at the same time; and the water being kept hot under cover, obviates boiling. We have found the following advantages in this machine:

1. It is neat and compact, and occupies but little room.
2. It confines the hot water under cover, and does not steam the room.
3. It is very easily worked.
4. It obviates soaking and boiling.
5. It does not rub the garments.
6. It saves at least half the labor required by other machines, or pounding barrels, washboards, &c.
7. It is simple in construction, cannot easily get out of order, is strongly made, and will probably last many years without repairs.

Hay and Grain Racks.

A correspondent in Indiana has requested directions for constructing a rack or frame for placing on an ordinary farm wagon, to draw hay and grain upon. There are many modes of construction, variously known and adopted in different localities, and possessing various advantages and defects. Among them we have selected two already well known to many of our readers, but doubtless new to others, and which, on the whole, are perhaps as good as any that are used.

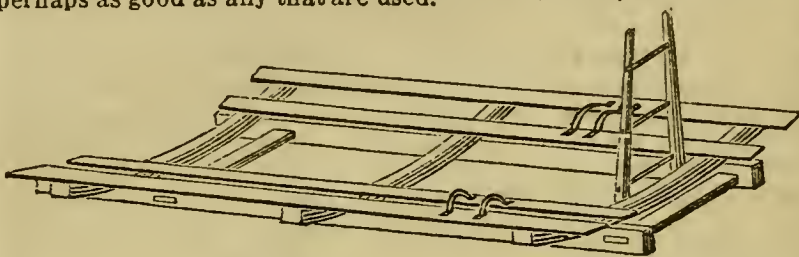


Fig. 1.

Fig. 1 represents a strong frame, the only objection to which is its weight, and the consequent inconvenience of placing and removing it from the wagon. It consists, first, of a bottom frame, (forming the foundation or base,) just wide enough to fit within the stakes of the wagon, made of two side pieces 10 inches wide, 2 inches thick, and about 13 feet long; these are connected at the ends by cross-pieces morticed through them. On this frame rest three curved cross-timbers, about 4 inches square and $6\frac{1}{2}$ or 7 feet long—

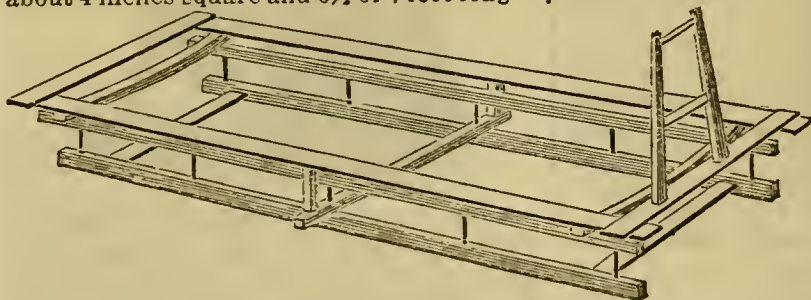


Fig. 2.

the curve may be about 6 inches, or enough for the boards that rest on them to clear the wheels—if the curve is less, the bottom frame must be wider. These timbers support two boards on each side, each board an inch thick and 6 inches wide, and about 13 feet long, or as long as the rack. Stiff, curved iron straps span from one board to the other over the forward wheels, to prevent the hay from resting on the tire. This frame or rack may be modified by making the bottom frame five or six inches wider, and using straight instead of curved cross-timbers, but this will make it heavier, and the load will not rest so securely upon it.

Fig. 2 exhibits a lighter and more perfect

frame, but requiring more labor in construction. The eight upright pins or standards, connecting a light foundation frame with a lighter one above, renders the whole so manageable that it may be very easily placed upon or removed from the wagon. The cross-timbers, (consisting of only one at each end,) need not be so much curved—a curvature of three inches is sufficient, and they will be large enough if $2\frac{1}{2}$ by 4 inches; their length may be about $6\frac{1}{2}$ feet, or, if the rack is large, 7 feet. The bottom frame may be made of 3

by 5 inch stuff, 13 feet 6 inches long, and the top frame 2 by 3 stuff. An inch board a foot wide goes all around the top, the extreme length of which is about 14 feet. In both these racks the bottom frame must be made just wide

enough to fit within the upright stakes of the wagon, which is usually about 3 feet 2 or 3 inches. The short ladder placed at the forward end, to prevent the load from falling forward, and to fasten the reins to during the operation of loading, should be about four feet high.

Another form of construction is first to make a foundation frame of side pieces about 2 by 8 inches, connected together by four cross-bars morticed into them, nearly as already described, the cross bars being of

white oak or other hard wood, into which oblique mortices are cut on each side, within the side pieces. These oblique mortices receive sloping side frames, which complete the rack—the feet of the side frames being thrust into the oblique mortices, and the frame

resting against the top of the foundation frame. This rack is not so substantial as the preceding, but as the side frames are taken out and put in separately, one person may more easily place the whole on the wagon.

Preserving Shingles.

Every farmer knows that the cost of the roofs of his buildings, as well as keeping them in repair, is a large item in his expenditures. Experiments should be made to lessen this cost. We observe the following in a late paper:—Dip the shingles in a tub of whitewash made of lime and salt. Line with red chalk. The carpenter may get a little lime on his hands and linen pantaloons, but this difficul-

ty is not a very formidable one. The lime will harden the wood, and prevent its wearing away by rain and weather, and will effectually exclude moss, a common hastener of decay. It is said that shingle roofs will last twice as long when treated in this way, as without it.

Whitewashing each successive layer of shingles after nailing down, is sometimes adopted, but is less effectual. Whitewashing the roof when completed, is comparatively useless, as the lime or but little of it can enter between the shingles, where the water lodges and hastens decay.

Some one may object that this operation is "troublesome," but so is nearly everything that is done in a thorough and consequently economical manner.

Facts for Poor Farmers.

"Those farmers who have most difficulty to make ends meet, always plow most and keep most stock. Now these men take the true plan to keep themselves always poor, because their crops and stock are always poor and bring little." So writes John Johnston, in a letter to the Secretary of our State Society; and he thus illustrates his statement:—"It is good profit to raise 300 bushels wheat from ten acres, but when it takes thirty acres to raise that amount it is raised at a loss. So it is with cattle and sheep. You will see the thinking farmer making four year old steers worth from \$60 to \$80 each, and his neighbors at the same age not worth over \$25 to \$40." His advice to the latter is, "if his land is exhausted he should plow no more than he can thoroughly manure. Seed with clover and grass and let it rest, and that field will not only pay well for tillage, but it will furnish manure (if rightly managed) to make another field of the same size rich also." And then keep it rich; do not run it with grain until again exhausted, or "the latter end of that land will be worse than the first."

Time for Cutting Timber.

We have been long satisfied that the best time to cut timber is in summer, provided it is not left in the log, but is immediately worked up into boards, rails, or whatever is intended. It dries rapidly, and becomes hard and sound. Cut and saw basswood in summer, and in a few weeks it will become thoroughly seasoned, and will finally harden so as to almost resemble horn. Cut it in winter, and it will be so long in seasoning as to become partly decayed before the process can be completed. No doubt the presence of the water or sap in great abundance in

winter, and especially toward the latter part, hastens this incipient decay. Rails cut and split in summer, and the bark peeled to hasten drying, have lasted twice as long as winter cut rails. A correspondent of the New-England Farmer says he cut and split a chestnut tree early in summer, and "it dried the best and brightest wood he ever cut." It is the practice to cut nearly all timber in the comparative leisure of winter; but there is no doubt that it would be better to pay a higher price to have it done in summer. We would especially invite observation and attention to the subject.

Durability of Posts.

A correspondent of the New-England Farmer reports an experiment on the durability of posts, which we re-arrange and condense. The timber used was "Yellow oak;" it was cut in winter, and each log was large enough to split into two bar-posts, which were set the following spring:

1ST PAIR.—Butt end down, one charred. Both rotted off the third year; the upper ends were then put in the ground, and they lasted seven years more.

2D PAIR.—Butt end down, one salted by boring and plugging. Salted post gave out the second year; the unsalted the fourth year. The ends were then reversed, and each lasted about eight years longer.

3D PAIR.—One butt down, the other butt up. The butt rotted off the third year; the other the fourth. The ends were reversed, and the new butt rotted one year before the other, although the latter was set one year the soonest.

4TH PAIR.—Small ends down, one salted. Both rotted off the fourth year; and being reversed, lasted four years more.

It will be seen that the charring did no good, and salting a green post is useless if not injurious. All the experiments indicate decidedly that posts set reversed last longest; and it appears that seasoned posts last longer than green—the seasoned small ends in the first experiment lasting about twice as long as the green small ends in the fourth.

To Keep Plows Bright.

The moment the plow comes from the field after use—for every good farmer brings his plow in after his job is done, and does not leave it in the field—grease the bright mould-board and other parts with any kind of cheap grease, which has no salt in it, or with lamp oil. The latter may be best where mice frequent, unless a little arsenic is worked in with the grease, which would soon settle all accounts with these vermin.

Sawing and Thrashing by Horses.

S. E. Tonn gives the following statement in the *Country Gentleman* of his success with an endless chain two-horse power:—I can saw three cords of wood per hour with two horses, with a circular saw; and with a drag saw, with no help but a boy ten years old, I sawed off logs twenty-six inches in diameter in seventy-five seconds per log, including starting and stopping time; drive my grist-mill, clover machine and horse corn-sheller, with which we can shell, clean and deliver in the bag, ready for market, seventy bushels of shelled corn per hour; and by driving business a little, we could do more than this. But this is ordinary work, with an ordinary elevation of the power.

Two years ago I had a good crop of barley, and could not get it half in the barn; and so we would haul a load to the barn, and put the horses on the power, and thrash it about as quickly as we could pitch it up into the mow, and with the same help that was necessary to merely unload it.

For several years past I have raised more or less buckwheat, and by having a horse power and thrasher of my own, I was enabled to get my buckwheat all thrashed before my neighbors had really thought of thrashing theirs. Last fall was a very unfavorable autumn for securing buckwheat; but as soon as the buckwheat appeared at all dry, we could thrash; while my neighbors lost full one-half of their crop before they could possibly get it thrashed. But this is not all. As my buckwheat was secured before it had become water-soaked, it would make much better flour, and millers were willing to pay from four to five cents more per bushel than they would pay for that which had been exposed to storms for several weeks.

My thrasher stands on the second floor of the barn, and the grain falls on the first floor. Therefore, all the help that is needed is a boy to keep away the straw, which a very small boy does with ease, and one to feed, and one to pitch the grain off the wagon. As a general thing, I thrash my grain in the winter, when we have but little to do, and when we can use up the straw economically.

Provide Domestic Conveniences.

Let the wood-house be level with and adjoin the kitchen, and be always supplied with good fuel and dry kindling wood; let the well be provided with the best apparatus for drawing water easily—provide ample cisterns, and connect them, by means of good pumps, with the kitchen—procure the best cook-stove, washing machine, easy churn, butter worker, clothes frames, carpet sweep-

er—and, if needed, the family sewing machine should not be overlooked. We have known the time when at least one active domestic was required to perform the extra labor of the various operations of building building fires of wet wood, working an awkward churn, washing on a rickety washboard, scrubbing the floor with a worn out broom, tying the clothes line to a peach tree, horse-post, barn corner, and smoke-house, borrowing water at a neighbor's, driving the pigs out of the yard, making sour bread for want of good wood, making rancid butter for want of a good dairy, and deficiencies in smaller domestic appliances.

The Use of Rawhide.

How few persons know the value of rawhide. It seems almost strange to see them sell all of their "deacon" skins for the small sum of thirty or forty cents. Take a strip of well-tanned rawhide an inch wide, and a horse can hardly break it by pulling back—two of them he cannot break any way.

Cut into narrow strips and shave the hair off with a sharp knife, to use for bag-strings; the strings will out-last two sets of bags. Farmers know how perplexing it is to lend bags and have them returned minus strings.

It will out-last hoop-iron (common) in any shape, and is stronger. It is good to wrap around a broken thill—better than iron.

Two sets of rawhide halters will last a man's lifetime—(if he don't live too long.)

In some places the Spaniards use rawhide log-chains to work cattle with, cut into narrow strips and twisted together hawser fashion. It is good to tie in for a broken link in a trace chain. It can be tanned so it will be soft and pliable, like harness leather. Save a cow and "deacon's pelt," and try it.—COUNTRY GENTLEMAN.

How to Tan Rawhide.

When the hide is first taken from the animal, spread it flesh side up; then put two parts of salt, two parts of saltpetre and alum combined—(or as much saltpetre and alum as salt)—make it fine; sprinkle it evenly over the surface; roll it up, and let it lay a few days till dissolved. Then take off what flesh remains, and nail the skin to the side of a barn in the sun, or in dry weather stretch on the ground by driving pegs in the edges of the skin. It must be stretched tight, or there will be hard and ugly wrinkles you cannot get out. After drying, and the flesh is sufficiently off, it is fit to cut up. But to make it "soft and pliable like harness leather," put neatsfoot oil on it—fasten it up again, and let it remain a day or two in the sun. Then take a stick about three inches

wide, and long enough to work with both hands, made like a wedge on the end, and rub out all of the oil that can be, and it is tanned with the hair on.

Some persons say a calf skin, (a deacon is better,) tanned in this way, and the hair taken off, and blackened, makes excellent boot leather, warranted not to crack. The only trouble is, it will last too long.

Cow skins are stronger and heavier, and are sometimes only salted and stretched; the flesh taken off, cut into strings, braided into halters or other useful things—the hair shaved off with a sharp knife. To make these strips soft they are oiled, buried in cow manure for a few days, then rubbed and worked till dry.

The skin of a white animal is not No. 1, nor a red and white, nor a black and white. Avoid spotted skins of any kind. Red is good; black is better.

For an ox whip, cut these strings about one inch wide at the top, and about eight or ten feet long, running to a point, with a buckskin cracker one inch wide, and eight inches long. Hang it to a stick about the length of a walking cane. The stick should be the top of a little pine or cedar. You can crack it so it can be heard as far as you can one of Col. Colt's pistols. It will last as long as the average county insurance companies.—COUNTRY GENTLEMAN.

Sap Pails.

The best kind of pail we have met with is made of tin. These may be kept clean more easily than any other kind, and never impart any sourness to the sap. They may be a little larger at the top, so as to pack away in nests when not in use. Or, they may be made smaller and cheaper, if the sap is gathered frequently—which will be no detriment to its quality. Nine quart pails may be procured for \$35 per 100, and six quart for \$30. They would soon pay for themselves in the increased value of the fine sugar and molasses afforded by them. The top is wired, like a tin-pan, and a hole under this wire receives the nail on which the pail hangs, thus securing it from swine or other animals, should they happen to stray into the woods; and being hung close to the spout, there is no danger of the wind blowing the dropping sap away. Old horse-shoe nails, straightened and sharpened, are best for this purpose. The best spouts are made of thick tinned iron, and for this mode of securing the vessels, they need not be more than two or three inches long, widest at the end which enters the tree, and made concave by placing the flat strips of metal between a convex and concave piece of wood, and giving them a blow with a mallet.

While boiling, large quantities of sap should not be poured in at a time, as that will stop the boiling and make irregular work; but a reservoir should be placed above the boiler, into which a faucet should be inserted, and the sap allowed to run in a constant stream, which a little practice will enable the operator to regulate to correspond exactly with the evaporation. A stop-cock should also be placed in the boiler to draw off the syrup.

The Cost of Fences.

The Maine State Agricultural Report presents some striking statistics in relation to the cost of fencing. The fences of the State have cost \$25,000,000; the repairs require \$2,500,000 annually; 6 per cent. interest is \$1,500,000; and a renewal in 20 years would be \$1,250,000; making the total yearly expense \$5,250,000—or two-thirds the original cost of the Erie canal. A strong argument in favor of soiling. Estimated cost of road fences, supposed to be at least one-eighth part of the whole, \$3,125,000. The interest and cost of annual repairs and renewing, would be \$331,000—the tax paid annually by the farmers of Maine to make the highway a public pasture. To this sum is to be added \$150,000, the yearly cost of breaking through snow drifts caused by such fences, and opening roads. These estimates will do to apply to other places besides Maine. The custom now is that every man shall fence out all intruders; the time may come when this will be among the things of the past, as much as that of walling towns to shut out human marauders.

Use of the Clod-Crusher.

SANFORD HOWARD states, in the Boston Cultivator, that the following course is successfully pursued in Scotland with the clod-crusher:—It is of course only used on heavy clay lands, which on plowing break up into large clods, and the land must be comparatively free from stone. The soil having been plowed, and left in large clods, a grubber is passed over the whole, loosening up the clods and leaving them at the surface. The grubber, as our readers may be aware, is like a harrow or cultivator, with long hooked teeth, which loosen the soil as deep or deeper than the plow has run. The clod-crusher is next passed, which breaks the clods into fragments, at the same time it tends to press the soil too compactly together. An indispensable part of the operation is now to follow with a grubber to loosen the crumbled soil.

We have known a corn crop to be nearly doubled in product by the use of a one-horse clod-crusher between the rows, to reduce the lumps into mellow earth. On undrained clay soils, its use would undoubtedly be often eminently advantageous.

USEFUL TABLES.

Value of Food for Domestic Animals.

The figures giving the number of pounds of any one substance to be equal to the quantity given of any other—the results of experiments:

	POUNDS.
Good Hay,.....	100
Good Clover Hay,.....	95
Rye Straw,.....	355
Oat Straw,.....	220
Potatoes,.....	195
Carrots,.....	280
Beets,.....	346
Ruta Bagas,.....	262
Wheat,.....	43
Peas,.....	44
Beans,.....	46
Rye,.....	49
Barley,.....	51
Indian Corn,.....	56
Oats,.....	59
Buckwheat,.....	64
Oil Cake,.....	64

Weight of Grain.

Wheat is 60 lbs. to the bushel in all the States except Connecticut, where it is 56 lbs. Rye is 56 lbs. in nearly all the States; Corn 56 in nearly all, but 58 in New-York; Oats 32 lbs.; Barley 48 lbs.; Buckwheat 46 to 50, but mostly 48; Clover Seed mostly 60, but 64 in Ohio and New-Jersey; Timothy 44; Flax Seed 56; Potatoes 60; Beans mostly 60, but 62 in New York, and 56 in Ohio; Blue-grass Seed 14 lbs.; Hemp Seed 44 lbs.; Dried Peaches 28 to 33; Dried apples, 22 to 28.

Consumption of Hay.

The hay consumed by different animals does not vary greatly from three pounds daily for each hundred pounds of the animals. The following table is the result of various experiments, by different persons, and will be useful for farmers who wish to determine by calculation beforehand how their hay will hold out for the winter, 500 cubic feet of Timothy hay, in a full bay, being about one ton:

	POUNDS.
Working horses,.....	3.08
Working oxen,.....	2.40
Milch cows, (Boussingault's,).....	2.25
Milch cows, (Lincoln's,).....	2.40
Young growing cattle,.....	3.08
Steers,.....	2.84
Dry cows,.....	2.42
Pigs, (estimated,).....	3.00
Sheep,.....	3.00
Elephant,.....	3.12

To Measure Grain in the Granary,

Divide the cubic feet by 56, and multiply by 45, and the result will be struck measure.

To Measure Corn in the Crib,

Multiply the length, breadth, and height together, in feet, to obtain the cubic feet; multiply this product by 4, and strike off the right figure, and the result will be shelled bushels, nearly.

United States Bushel and Gallon.

The United States bushel, adopted now by the State of N. York, is 2150.40 cubic inches.

The gallon, 231 cubic inches.

The dry measure gallon, or one-eighth of the bushel, is 268.8 cubic inches.

Measures of Length.

Gunter's chain, used by surveyors, is 66 feet long, or 4 rods, and each link is 7.92 inches.

The French metre is a ten millionth part of the arc of the meridian, extending from the equator to the pole, and is 39.37079 English inches, or 3.28174 feet. The other French measures, founded upon this, increase or decrease regularly by ten, and are as convenient, therefore, for adding or subtracting as our dollars and cents.

Measures of Weight.

The French gramme is 15.44 grains, and the kilogramme, (1,000 grammes,) is 2 lbs. 3 oz. 5 drams.

Weights of a Cubic Foot,

Of various substances, from which the bulk of a load of one ton may be easily calculated:

	POUNDS.
Cast Iron,.....	450
Water,.....	62
White Pine, seasoned, about.....	30
White Oak, seasoned, about.....	52
Loose earth, about.....	95
Common soil, compact, about.....	124
Clay, about.....	135
Clay with stones, about.....	160
Brick, about.....	125

Bulk of a Ton of Different Substances.

23 cubic feet of sand, 18 cubic feet of earth, or 17 cubic feet of clay, make a ton. 18 cubic feet of gravel or earth, before digging, make 27 cubic feet when dug; or the bulk is increased as three to two.

Capacity of Soils for Water.

The following substances are saturated when they contain, of their own weight:

Sand,.....about 24 per cent. of water.
 Calcareous Sand, about 28 per cent. of water.
 Loamy soil,.....about 38 per cent. of water.
 Clay Loam,.....about 47 per cent. of water.
 Peat,.....about 80 per cent. of water.

Velocity of Water in Tile Drains.

An acre of land, in a wet time, contains about 1,000 spare hogsheads of water. An underdrain will carry off from a strip of land about 2 rods wide, and one 80 rods long will drain an acre. The following table will show the size of the tile required to drain an acre in two days time, (the longest admissible,) at different rates of descent; or the size for any larger area:

Diameter of Bore.	Rate of Descent.	Velocity of current pr second.	Hogsheads discharged in 24 hrs.
2 inches.	1 foot in 100	22 inches.	400
2 inches.	1 foot in 50	32 inches.	560
2 inches.	1 foot in 20	51 inches.	900
2 inches.	1 foot in 10	73 inches.	1290
3 inches.	1 foot in 100	27 inches.	1170
3 inches.	1 foot in 50	38 inches.	1640
3 inches.	1 foot in 20	67 inches.	3100
3 inches.	1 foot in 10	84 inches.	3600
4 inches.	1 foot in 100	32 inches.	2500
4 inches.	1 foot in 50	45 inches.	3500
4 inches.	1 foot in 20	72 inches.	5600
4 inches.	1 foot in 10	100 inches.	7800

A deduction of one-third to one-half must be made for the roughness of the tile or imperfection in laying. The drains must be of some length to give the water velocity, and these numbers do not, therefore, apply to very short drains.

Contents of Cisterns.

The following gives the contents of circular cisterns, for each foot in depth:

	BARRELS.
5 feet diameter,.....	4.66
6 feet diameter,.....	6.71
7 feet diameter,.....	9.13
8 feet diameter,.....	11.93
9 feet diameter,.....	15.10
10 feet diameter,.....	18.65

Distances for Planting Trees, &c.

	FEET.
Apples, standard,.....	25 to 33
Apples, dwarf,.....	5 to 8
Pears, standard,.....	20
Pears, dwarf,.....	8 to 10
Peaches, headed back,.....	12
Cherries, standard,.....	20
Cherries, dwarf,.....	8 to 10
Plums, standard,.....	15
Plums, dwarf,.....	8 to 10
Quinces,.....	6 to 8
Grapes,.....	10 to 12
Gooseberries and Currants,.....	4
Raspberries,.....	4
Blackberries,.....	6 to 8

For the above distances, the following is the number of trees required for an acre:

At 4 feet apart each way,.....	2,720
At 5 feet apart each way,.....	1,742
At 6 feet apart each way,.....	1,200
At 8 feet apart each way,.....	680
At 10 feet apart each way,.....	430
At 12 feet apart each way,.....	325
At 15 feet apart each way,.....	200
At 18 feet apart each way,.....	135
At 20 feet apart each way,.....	110
At 25 feet apart each way,.....	70
At 30 feet apart each way,.....	50
At 33 feet apart each way,.....	40

Force of Windmills.

The force exerted by windmills will vary greatly with the velocity of the wind. The following table shows the pressure against a fixed surface; from the velocity given in this table, the average velocity of the sails must be deducted, and the remainder will show the real force exerted:

Miles an hour.	Pressure in lbs. on square ft.	Description.
1	.005	Hardly perceptible.
2	.020	Just perceptible.
3	.045	
4	.080	
5	.125	Light breeze.
6	.180	
7	.220	Gentle, pleasant wind.
10	.500	
15	1.125	Pleasant, brisk wind.
20	2.000	
25	3.125	Very brisk.
30	4.500	
35	6.125	Strong, high wind.
40	8.000	
45	10.125	Very high.
50	12.500	
60	18.000	Storm or tempest.
80	32.000	Great storm.
100	50.000	Hurricane.
		Tornado, tearing up trees and sweeping off buildings.

Quantity of Seed required for an Acre.

Wheat,.....	1½ to 2 bushels.
Rye,.....	1½ bushels.
Oats,.....	3 bushels.
Barley,.....	2 bushels.
Peas,.....	2 to 3 bushels.
White Beans,.....	1½ bushels.
Buckwheat,.....	½ bushel.
Corn, broadcast for fodder,.....	4 bushels.
Corn, in drills for fodder,.....	2 to 3 bushels.
Corn, in hills,.....	4 to 8 quarts.
Broom Corn,.....	½ bushel.
Potatoes,.....	10 to 15 bushels.
Beets,.....	3 pounds.
Carrots,.....	2 pounds.
Ruta Baga,.....	¾ pound.
Millet,.....	½ bushel.
Clover, White,.....	4 quarts.
Clover, Red,.....	8 quarts.
Timothy,.....	6 quarts.
Orchard Grass,.....	2 bushels.
Red Top,.....	1 to 2 pecks.
Kentucky Blue Grass,.....	2 bushels.
Mixed Lawn Grass,.....	1 to 2 bushels.
Tobacco,.....	2 ounces.

Quality of Different Kinds of Wood.

The celebrated experiments of Marcus Bull, of Philadelphia, many years ago, gave the following results, showing the amount required to throw out a given quantity of heat:

Hickory,.....	4 cords.
White Oak,.....	4¾ cords.
Hard Maple,.....	6¾ cords.
Soft Maple,.....	7 1-5 cords.
Pitch Pine,.....	9 1-7 cords.
White Pine,.....	9 1-5 cords.
Anthracite Coal,.....	4 tons.

Gestation of Animals.

KINDS OF ANIMALS.	Proper age for Reproduction.	Period of the Power of Re-production.	Number of Females for one Male.	Period of Gestation and Incubation.		
				Shortest Period.	Mean Period.	Longest Period.
		YEARS.		DAYS.	DAYS.	DAYS.
Mare,.....	4 years.	10 to 12	.....	322	347	419
Stallion,.....	5 years.	12 to 15	20 to 30			
Cow,.....	3 years.	10	.....	240	283	321
Bull,.....	3 years.	5	30 to 40			
Ewe,.....	2 years.	6	.....	146	154	161
Tup,.....	2 years.	7	40 to 50			
Sow,.....	1 year.	6	.....	109	115	143
Boar,.....	1 year.	6	6 to 10			
She-Goat,.....	2 years.	6	.....	150	156	163
He-Goat,.....	2 years.	5	20 to 40			
She-Ass,.....	4 years.	10 to 12	.....	365	380	391
He-Ass,.....	5 years.	12 to 15	.....		
She-Buffalo,.....	.....	.....	.....	281	308	335
Bitch,.....	2 years.	8 to 9	.....	55	60	63
Dog,.....	2 years.	8 to 9	.....		
She-Cat,.....	1 year.	5 to 6	.....	48	50	56
He-Cat,.....	1 year.	9 to 10	5 to 6			
Doe-Rabbit,.....	6 months.	5 to 6	.....	20	25	35
Buck-Rabbit,.....	6 months.	5 to 6	30			
Cock,.....	6 months.	5 to 6	12 to 15			
Turkey,.....	.....	.....	.....	24	26	30
Hen,.....	.....	3 to 5	.....	19	21	24
Duck,.....	.....	.....	.....	28	30	32
Goose,.....	.....	.....	.....	27	30	33
Pigeon,.....	.....	.....	.....	16	18	20

Quantity of Garden Seeds to Plant.

Asparagus—One ounce produces one thousand plants; requires a seed bed of about 12 feet.

Asparagus Roots—One thousand plants bed 4 feet wide and 225 feet long.

Beans—One quart plants from one hundred to one hundred and fifty feet of row, or one hundred and fifty to two hundred hills.

Beets—One ounce plants one hundred and fifty feet of row.

Broccoli—One ounce gives 2,500 or 3,000 plants; requiring 40 square feet of ground.

Brussels Sprouts—Same as Broccoli.

Cabbage—Early sorts, the same as Broccoli; the later require 60 feet of ground.

Cauliflower—The same as late Cabbage.

Carrot—Three or four pounds to the acre; one ounce to 150 feet of row.

Celery—One ounce gives 7,000 or 8,000 plants; requiring 80 feet of ground.

Cucumber—One ounce for 150 hills.

Cress—One ounce sows bed 16 feet square.

Egg Plant—One ounce gives 2,000 plants.

Endive—One ounce gives 3,500 plants; requiring 80 feet of ground.

Kale—Same as Broccoli.

Leek—One ounce gives 2,000 plants; requiring 60 feet of ground.

Lettuce—One ounce gives 7,000 plants; re-

quiring seed bed of one hundred and twenty feet.

Melon—One ounce for one hundred and twenty hills.

Nasturtions—One ounce sows twenty-five feet of row.

Onion—Four or five pounds to the acre; one ounce of seed sows two hundred feet of row.

Okra—One ounce sows two hundred feet of row.

Parsley—One ounce sows two hundred feet of row.

Parsnip—One ounce sows two hundred and fifty feet of row.

Peppers—One ounce gives 2,500 plants.

Peas—One quart of smaller sorts sows one hundred and twenty feet of row; of larger, two hundred feet of row.

Radish—One ounce to one hundred feet.

Salsify—One ounce to one hundred and fifty feet of row.

Spinage—One ounce to two hundred feet of row.

Squash—One ounce to 75 hills.

Tomato—One ounce gives 2,500 plants; requiring seed bed of 80 feet.

Turnip—One and a half pounds to the acre; one ounce to 2,000 feet.

Watermelon—One ounce to 50 hills.

THE DAIRY.

On Cheese Making.

Mrs. S. JOHNSON, of Schuyler Falls, N. Y., in a letter to the COUNTRY GENTLEMAN, says:

After twenty-five years' experience in the business of the dairy, we having always kept from twenty to twenty-five cows, I think I can give a very good receipt for new beginners.

For ten pails of milk, as soon as milked, while warm, put in the rennet, according to the strength, enough to set it. If it does not set it in fifteen minutes, add a little more. When the curd has set, take a long wooden knife and cut through the curd, both ways, carefully. Let it stand about five minutes, then stir with the hand carefully. Place the strainer over the tub, and dip off the whey. Now dip in pans, and set in a cool place over night.

In the morning run up your curd in the same way, and after cutting, put in last night's curd after draining, and squeeze very carefully with the hand. Dip off one pail of whey, and heat scalding hot; if not scalded alike, heat more and stir continually. Then place a ladder over another tub with a strainer and basket, and dip the curd and whey into the strainer. Do not let it settle together. Then remove it back to the tub, and mix one pint of best salt. If sage is wished, three tablespoonfuls is a plenty if dried and sifted. Then put in the hoop, and it is ready for the press. Turn in four or five hours, and let it remain until the next morning; then grease with lard. If the cheese is large, bandage when spread enough. Keep the cheese room dark days, and raise the window nights.

Butter Making.

Our friend HIRAM MILLS, of Lewis county, who has frequently taken Butter prizes at our State Fairs, gives the following as his method, in the Transactions for 1858:

Milk set in tin pans on rack or slat shelves (temperature of room 70 deg.) and allowed to stand until it is sour, and sometimes until it thickens, but never should be allowed to stand until it turns spotted, as that injures the flavor of the butter. Cream taken from the milk and kept in tin cream-pail until enough is obtained for a churning; use crank churn, propelled by hand: churn from forty to fifty pounds at a time. After the butter has come, draw off the buttermilk and wash with cold water in the churn, unless the butter comes very hard, when the washing is omitted. Butter taken from the churn and

worked thoroughly by hand until it is freed from the milk; then apply one ounce Ashton salt to one pound of butter, which should be well worked in, to prevent the butter from being streaked; it is then allowed to stand twenty-four hours, after which it is worked with a butter-worker, being careful not to injure the grain. No other substance is used to preserve the butter. Have generally used this kind of salt in making butter; usually pack in eighty-pound tubs, and as soon as one is filled cover with a thin cloth and then a quantity of salt to exclude the air. Tubs are prepared by soaking in brine.

To which may be added, that there is no doubt that every vessel used in the manufacture of the butter, is kept in a state of perfect sweetness and cleanliness, and that no bad odors approach the dairy.

Rules for Cheese Making.

A correspondent of the COUNTRY GENTLEMAN gives the following two rules, which may be useful to young cheese manufacturers:

1st. TO ASCERTAIN HOW MUCH CHEESE YOU OUGHT TO GET FROM YOUR MILK.—Multiply the number of pounds of milk by eleven—point off two figures for decimals, and the product is pounds and decimals of a pound of cheese fresh from the press.

EXAMPLE.—Given, 495 pounds milk—how many pounds of cheese ought it to get? 495 by 11, equal to 54.45 pounds, or 54 45-100 pounds.

This rule applies to the summer. In October you may safely make your cheese a little heavier from the same milk, or perhaps the October milk has a little more cheese in it. The rule is founded on experience. Of course this green cheese must lose a great deal in curing, since both the butter and casein constitute but about eight per cent. of milk.

2d. FOR ASCERTAINING THE QUANTITY OF SALT FOR CHEESE.—Multiply the number of pounds of milk by three—point off three places for decimals. Your answer is in pounds and decimals of a pound.

EXAMPLE.—How much salt for the curd of 495 lbs. of milk? 495 by 3, equal to 1.385, or one pound and 385-1000 of a pound. Now reduce this decimal to ounces, by multiplying by sixteen—point off three decimals as before. Your answer is, 385 by 16, equal to 6 160-1000 ounces, or 1 lb. 6 1-16 oz., is the quantity of salt required for the cheese of 495 pounds milk.

Butter Dairies of Chenango and Delaware Counties.

Chenango and Delaware are among the best butter producing counties in this State; and the following letters, from two of the best butter-makers in those counties, showing how they manage their butter dairies, cannot fail to be read with interest and profit:—

I. FROM JOHN SHATTUCK, OF CHENANGO.

1. In the first place you ask in regard to churning. We use dog power, having the temperature in warm weather about 55 deg. Fahrenheit, which gives the butter a good solid consistency.

2. When the butter comes, it is removed and washed with cold ice-water until the buttermilk is all removed.

3. It is then salted—about one ounce of salt to a pound of butter, worked in thoroughly—and set in a cool place for twenty-four hours, when it is worked just sufficient to remove all the buttermilk.

4. It is then packed in the firkin, and covered tight, so as to exclude the air.

5. When the firkin is filled, then you put a cloth over the butter, put on a good covering of salt, and then pour on water, which makes a brine. We keep it thus covered until it goes to market, (it being the only way we could ever keep a dairy perfectly sweet through the season.)

These rules, strictly observed, I will warrant never to fail, if the butter is properly made.

We use good white oak firkins. Manner of preparing them before putting in the butter—fill them with cold water, to soak three or four days; a handful of salt thrown in will make them all the better. When we get ready to put the butter in the firkin, we rub the inside all over thoroughly with salt, which forms a brine between the firkin and butter.

All the salt used about butter, in any form, should be good dairy salt, as there is more or less lime in other salt, which renders it unfit for butter.

Good soft water is also essential, as hard limy water is very objectionable.

II. FROM S. L. WATTLES, OF DELAWARE.

1. The cows are milked regularly at the same hour morning and evening. The milk is not allowed to stand long in the milk-pails after milking, but is immediately carried to the milk-rooms and strained into tin pans. Only about three quarts are put in a pan, so that the milk may never stand more than two inches deep, often less in very hot weather.

2. The milk-room is above ground, and in the summer time kept as cool as possible and well aired. The milk is left to stand in the pans from thirty to thirty-six hours—never

more than thirty-six, and then the cream is taken off.

3. The cream is put in large tin pails with covers, and if the weather is warm the cream pails are set in the cellar to cool the cream.

4. The intention is, always to skim the milk before it gets much sour. Cream rises in pans set as above stated very quickly, and the sooner it is taken off after it has risen the better, both for the quality and quantity of the butter made from it. Cream will all rise, if the milk is very shallow in the pans, even in the hottest weather. And if it is taken off soon enough it will all be saved—while if the milk stands deep in the pans it will sour before much of the cream rises, or if allowed to stand too long before skimming, the cream is wasted and injured in quality.

5. Our women have a way of taking off the cream without the use of the skimmer. They use a knife only. They run the knife around the milk in the pan to separate the cream from the sides of the pan. Then they set the bottom of the milk-pan at the edge, on the rim of the cream pan, then with the left hand elevate one side of the milk-pan so that the cream with the help of the knife in the right hand will run off into the cream pan. After a little practice it is done very quickly and saves both time and cream.

6. The churning is performed every day. The cream taken off one day is churned the next morning. The common crank churn is used, and is worked by dog power. This crank churn is used because it is easiest attached to, and worked by dog power, and because it is more convenient to wash the butter in than the barrel or dash churn. The churning is done very slowly, requiring from two to three hours. The cream having been in the cellar all night, is always cool enough to commence the churning, but if the weather is very hot, and the temperature of the cream is likely to get too high while churning, cold water is put into the churn to keep it down—as very good butter cannot be made when the cream is warmer than 65 deg. when the butter is coming.

7. After the butter has come, the buttermilk is immediately drawn off through a hole in the end of the churn, and then about a half a pail of cold water is thrown into the churn on the butter. The crank of the churn is then turned around a few times and the water drawn off. After that a whole pail of water or more is thrown on the butter in the churn, and the crank again turned quickly a few times, and the water again drawn off, bringing with it every particle of buttermilk. The churn dasher is then taken out, and the remaining water is pressed out of the butter with a ladle.

8. The butter is then taken from the churn and put in the butter bowl and weighed, and it is then salted with one ounce of Ashton salt to a pound of butter. The salt is well worked through the butter with a ladle, and the butter is set in the cellar and stands about twenty-four hours for the salt to dissolve, when it is again carefully worked, and the brine pressed out, and then immediately packed in the firkin.

9. The firkins are prepared for use by filling them with water, and letting them soak eight or ten days. They are then scalded with hot water and rinsed, and after that the inside of the firkin is rubbed with a lump of salt, and it is ready for use, and filled with butter within an inch of the top. A cloth is

then put on the butter and covered with salt half an inch deep, and then some brine poured on. The firkin is then covered up with a flat stone. Nothing more is done to them or the butter, except an occasional renewal of the brine when it dries away.

Dairies made in this way have frequently been kept at home, in the cellar, as late as March of the following season, before they were sold, and have stood all the tests of time and different markets and climates.

We pack our butter for family use through the following winter and spring, early in the fall, while the grass is good. It often lasts until the next June, and is always preferred to fresh butter made on hay in the winter, or on hay and grass together, in the spring.

THE APIARY.

Management of Bees.

One of the most successful managers of bees in Western New-York, on a moderate scale, and on the old system, is CURTIS COE, of Cayuga county. He has at present about a hundred and fifty hives, and derives an annual revenue from the sale of the honey, greater than most farmers raise from a hundred acres of good land. He has been in the business many years, and has derived most of his knowledge of bees and their management from his own close observation and experience. He has an additional advantage—in not finding any particular inconvenience in being stung a dozen times or more in a day, should he chance to become mixed up with a pugnacious swarm. A brief notice of his management may be interesting and useful to the inexperienced.

He adopts a simple box-hive, with a door and pane of glass on one side, and vacancies for glass boxes above.

Artificial as well as natural swarming is extensively employed. The present being an unfavorable year, the increase has been only about a dozen of each.

He has employed the movable combs on a plan of his own, but has not adopted it extensively, the crooked combs rendering it inconvenient.

Guide combs being always placed in his hives before the swarm is introduced, so that the combs may be made edgewise against the pane, he is enabled to inspect the operations to some extent at any time.

This arrangement also enables him to secure young queens for artificial swarming, their cells being usually on the outer edges. A puff of smoke sends the bees off of these, when a long-bladed knife, reached up in the

slightly raised hive from below, cuts them off, and they drop and are secured. In a few days, if taken at piping time, they come out the perfect queen.



The hiving of natural swarms is easily done. A hiving-box, consisting simply of any box holding nearly a half bushel, with one side open, is attached to a pole, as shown in Fig. 1. When the swarm comes out, the operator takes this box by its handle, the box being held over his head, and walks slowly in the midst of the flying swarm. They often alight upon it, and enter its open side. As soon as they begin doing so, it is placed in a fixed position against a fence or tree, or a crowbar hole is made by an attendant, into which the handle is inserted. When the bees have all settled, it is carried to the proper

place among the rest, and under which a temporary shelf has been placed, as shown

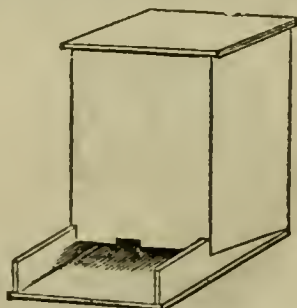


Fig. 2.

in fig. 2, and the bees are emptied by a slight jar upon this shelf. They immediately find

their way into the hive. It is best to empty out two or three successive portions at a time; and if they do not at once find the entrance, a quill sweeps a pint or two within, when their call is sure to attract the rest.

This shelf is made so as to raise the front of the hive about an inch or inch and a half high in front, and to keep the other sides closed; it consists simply of a board about twice as large as the bottom of the hive, with



Fig. 3.

a board, cut as shown in Fig. 3, nailed to each side. When the bees have all entered, it is withdrawn. The whole process is usually completed in a few minutes.

When the swarm does not alight in the hiving-box, but on some adjacent tree, the box is held up against the spot, as soon as they begin to cluster, when they leave the tree and pass into the box; or if they do not, a few jars with the side of the box induces them to loosen their hold and enter it. The operation is easily performed, and only a minute or two is occupied in their clustering.

One or two boxes, with long poles for handles, are provided for such swarms as settle too high up for ordinary reach.

The loss of a newly hived swarm, occasioned by their leaving the hive, which occasionally occurs to the owners of bees, has been prevented in this apiary, so that a single loss of the kind has not occurred in twenty years. It consists in simply placing the hive flat on the bottom board for a few days, instead of raising it at the corners the third of an inch, as is always practiced with established swarms.

Four honey boxes are usually placed in each hive, in a chamber, entered by a door, in the upper part.

These boxes are in the form of a cube, measuring about six or six and a half inches on each side. The top and bottom are made of half inch boards; the four sides of glass.

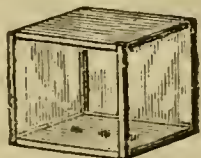


Fig. 4.

The edges of the boards are merely rabbeted to receive the panes, and they are held together by strips of tin on the corners, shielding the edges of the glass, and holding every part in its place. (Fig. 4.) The strips of tin

are half an inch wide and seven and a half long; they are folded longitudinally so that the two parts, each a quarter of an inch wide, stand at right angles, and thus form a corner edge of the box, and receive the edges of two panes. They are fastened to the top and

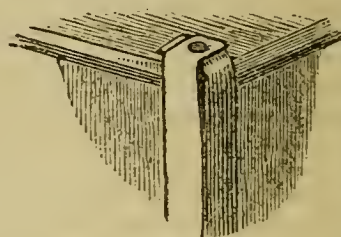


Fig. 5.

bottom board, as shown in Fig. 5, the tin having a short slit in each end, so that one part overlaps the other, and a single tack secures both to the wood. These boxes are quickly made, exhibit the honey handsomely for market, and are manufactured for 18 cents each. They will hold six or eight pounds of honey in comb. As soon as they are filled, which may be determined in a moment by inspection, they are taken out and replaced by empty ones, to be filled in turn.

Three holes, each an inch in diameter, in the bottom board, are bored smoothly with a bit, so as to coincide with three holes in the top board of the hive; and when they are removed, two strips of tin are pushed in under the box, one to shut the bees down into the hive, and the other to secure such as are in the honey box.

One strip is taken away with the box, and the other left on the hive.

The bees are easily driven out, by placing the box on another box of wood of the same size, and open only on the top, of which the honey box forms the tight cover. A slight and frequent jarring motion on the knee drives all the bees down into the dark box, where they soon cluster, and they may be emptied back on the shelf of the hive from which they were taken, or of any other hive not sufficiently supplied with bees. The middle of the day is selected to remove honey boxes, being then least occupied by bees, and especially by drones, which are the most difficult to drive out.

Guide combs are placed so that the combs may be made with the edge to the eye, and a narrow stick of comb is also placed so as to extend down through the middle hole.

The honey being secured as soon as the boxes are full, and while the comb is yet perfectly white, commands the highest price, and has sold in the New-York market at 30 cents a pound at wholesale.

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
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
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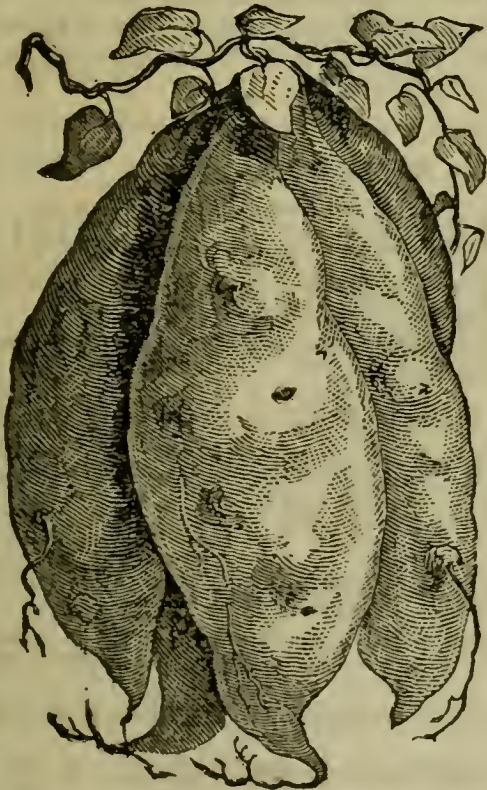
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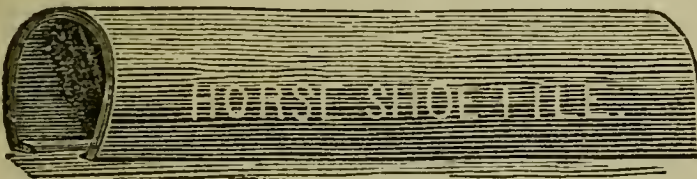
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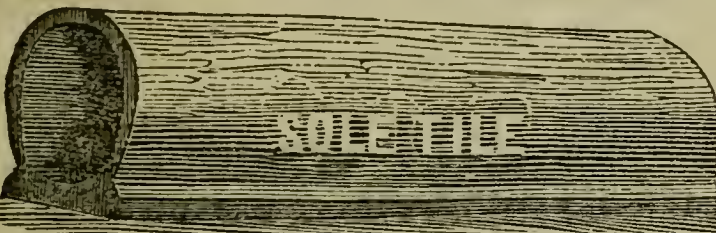
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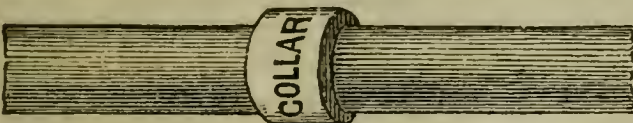
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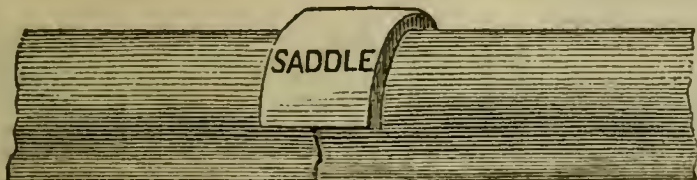
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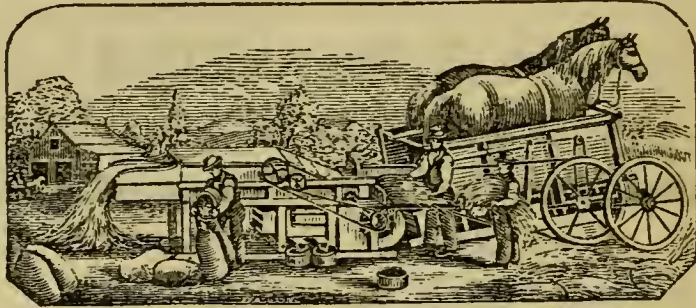
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
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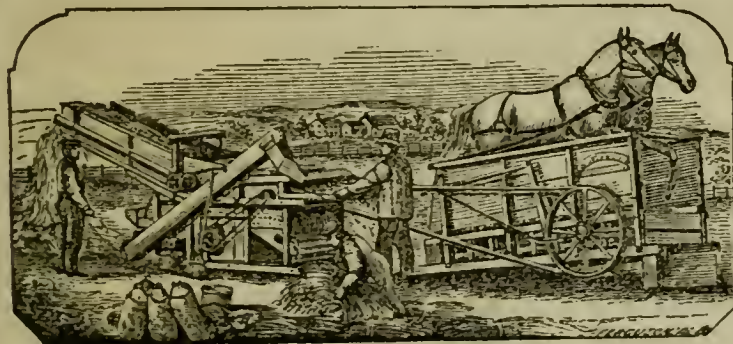
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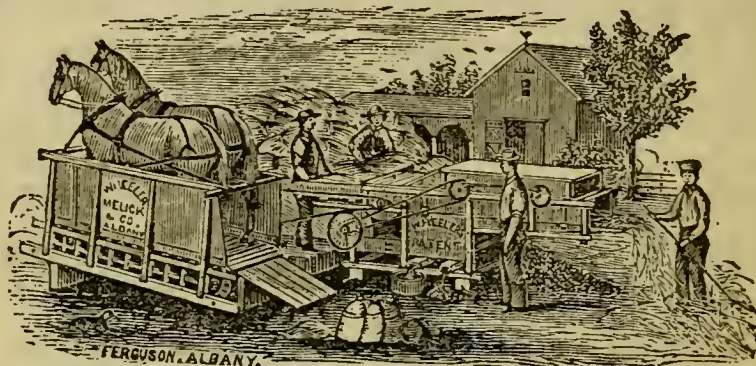
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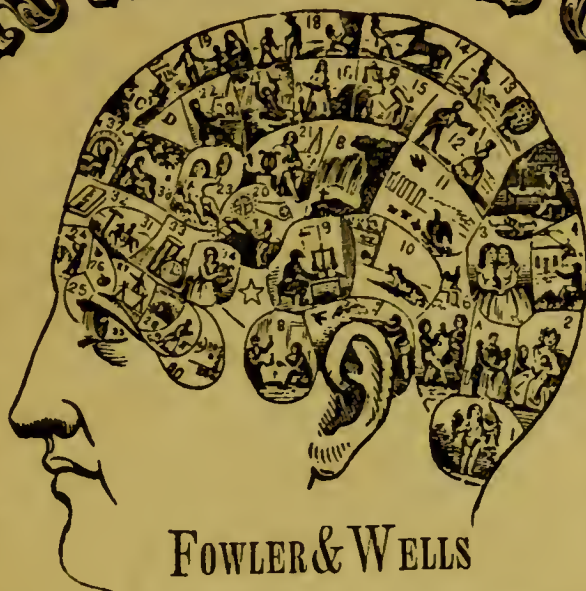
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